

EXHIBIT 26

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

Sonos, Inc.,	§	
	§	
Plaintiff,	§	No. 6:20-cv-881-ADA
v.	§	
	§	
Google LLC,	§	
	§	
Defendant.	§	

REBUTTAL DECLARATION OF KEVIN C. ALMEROTH

I, Kevin C. Almeroth, hereby declare as follows:

I. INTRODUCTION

1. This Declaration is based upon my own personal knowledge.
2. If I am called upon to testify regarding this Declaration, I would testify competently and truthfully to the matters discussed herein.
3. I understand that in the above-captioned action between Plaintiff Sonos, Inc. (“Sonos”) and Defendant Google LLC, Sonos has alleged that Google infringes certain claims of U.S. Patent Nos. 9,344,206 (the “‘206 patent”), 10,469,966 (the “‘966 patent”), and 10,848,885 (the “‘885 patent”) (collectively referred to herein as the “Zone Scene Patents”).
4. I previously submitted a declaration dated April 27, 2021 (referred to herein as “Opening Declaration”) that contained certain opinions as to how a person of ordinary skill in the art (“POSITA”) at the time of the inventions of the Zone Scene Patents would have understood certain claim terms. The contents of my Opening Declaration are incorporated by reference in their entirety.

5. I understand that on June 1, 2021 Google filed a responsive claim construction brief and a declaration in support thereof by Dr. Christos Kyriakakis. I have been asked to review and respond to the opinions set forth in Dr. Kyriakakis' declaration regarding the claim terms "data network," "zone configuration," and "group configuration."

6. In forming my opinions herein, I have reviewed Google's responsive claim construction brief ("Google Brief") and the exhibits referenced therein, Dr. Kyriakakis' declaration and the materials cited therein regarding the claim terms "data network," "zone configuration," and "group configuration," and the June 11, 2021 deposition transcript of Dr. Kyriakakis.

7. I reserve the right to supplement or clarify the opinions set forth herein, and if I am requested to do so, to provide additional opinions regarding the asserted claims of the Zone Scene Patents.

II. MY BACKGROUND

8. My background and CV are set forth in my Opening Declaration.

III. LEGAL STANDARDS

9. I set forth my understanding of certain legal standards regarding claim construction in my Opening Declaration.

10. I have been informed by counsel about legal standards relevant to indefiniteness because Dr. Kyriakakis opined that the terms "zone configuration" and "group configuration" found in the claims of the '206 Patent are indefinite.

11. I understand that an issued U.S. patent is presumed to be valid, which includes a presumption that the claims are not indefinite, and that the burden is on the party challenging validity to prove by clear and convincing evidence that a claim is invalid. Thus, I understand

that Google must prove by clear and convincing evidence that the terms “zone configuration” and “group configuration” are indefinite.

12. I also understand that a claim is invalid for indefiniteness if the claim, read in light of the specification and the prosecution history, fails to inform a POSITA about the scope of the claimed invention with reasonable certainty. In contrast, I understand that a claim is not invalid for indefiniteness if the patent is precise enough to afford clear notice of what is claimed and apprise the public of what is still open to them. I further understand that claims, when read in light of the specification and the prosecution history, must provide objective boundaries for a POSITA to understand the scope of the invention.

13. While I understand that reasonable certainty is the applicable standard for definiteness, I also understand that a modicum of uncertainty may be tolerated and that absolute precision is not required.

IV. LEVEL OF ORDINARY SKILL IN THE ART

14. I set forth my opinion regarding the level of ordinary skill in the art for the Zone Scene Patents in my Opening Declaration. I have reproduced my opinion regarding the level of ordinary skill in the art below:

[I]t is my opinion that a POSITA for purposes of this action is a person having the equivalent of a four-year degree from an accredited institution (typically denoted as a B.S. degree) in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately 2-4 years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience.

15. I understand that Dr. Kyriakakis reached a different conclusion. Specifically, Dr. Kyriakakis opined:

In my opinion, a person of ordinary skill in the art at this time would have had a bachelor's of science in electrical engineering, computer science or engineering, or a related field, and two to four years of work or research experience in the field of

information networks, data communications, or multimedia systems, or a Master's degree and one to two years of experience in the same field.

Kyriakakis Dec. at ¶ 31.

16. In my opinion, Dr. Kyriakakis' articulation of the level of ordinary skill in the art for the Zone Scene Patents is overly broad. For instance, Dr. Kyriakakis contends that "two to four years of work or research experience in the field of information networks, data communications, *or* multimedia systems" is sufficient. *Id.* I disagree for several reasons.

17. First, as noted in my Opening Declaration, the Zone Scene Patents disclose a "multi-zone system" (also referred to as an "entertainment system") comprising one or more "zone players" (also referred to as "players" or "playback devices") that are coupled to a "data network" and are capable of playing multimedia, such as audio, in "digital" format. *See, e.g.*, '206 Patent at 2:28-37; 3:13-15; 4:31-5:3; 5:9-6:5, FIG. 1. However, Dr. Kyriakakis formulates an overly broad definition of "data network" that encompasses any type of network that carries data, and thus, Dr. Kyriakakis' implied meanings of "information networks" and "data communications" encompass many types of "networks" and forms of communication, such as a traditional analog radio broadcast, that are not relevant to the Zone Scene Patents. *See, e.g., id.* at ¶ 62.

18. Second, Dr. Kyriakakis contends that 2-4 years of experience in the field of "multimedia systems" is sufficient, which appears to be broad enough to encompass conventional multimedia systems comprising passive speakers connected via traditional speaker wires. In my opinion, having 2-4 years of experience with such conventional multimedia systems alone would not make a person a POSITA for the Zone Scene Patents.

19. For at least these reasons, it is my opinion that Dr. Kyriakakis' articulation of the level of ordinary skill in the art is overly broad, and thus incorrect.

V. BRIEF OVERVIEW OF THE ZONE SCENE PATENTS

20. I provided a brief overview of the Zone Scene Patents in my Opening Declaration.

VI. “DATA NETWORK”

21. Each party’s proposed construction is set forth in the following table.

Sonos’s Proposed Construction	Google’s Proposed Construction
Plain and ordinary meaning “a medium that interconnects devices, enabling them to send digital data packets to and receive digital data packets from each other”	Plain and ordinary meaning; no construction necessary at this time

22. As I explained in my Opening Declaration, it is my opinion that Sonos’s proposed construction is consistent with how a POSITA would have interpreted the term “data network” in the context of the Zone Scene Patents because that construction properly specifies that a “data network” requires (i) *two-way* communication of data (*i.e.*, sending and receiving data) that is (ii) exchanged in the form of *digital data packets*.

23. However, Dr. Kyriakakis disagrees with Sonos’s proposed construction and opines that “[i]n the context of these patents, a person of ordinary skill in the art would have understood that the general understanding of the term ‘data network’ does not restrict the type of data (digital or analog), the manner of transmission (packet or non-packet form), or the nature of the communication (bi-directional or unidirectional).” Kyriakakis Dec. at ¶ 60. I disagree for the reasons set forth below.

A. Dr. Kyriakakis Flawed Interpretation of “Data Network” Results in a Definition That is No Different Than “Network”

24. It is my opinion, Dr. Kyriakakis did not consider how the term “data network” (which as noted in my Opening Declaration is a term of art) would have been understood by a POSITA at the time of the invention. Instead, it appears to me that Dr. Kyriakakis interpreted

the term “data network” as a layperson might, which I understand is an improper approach for construing patent claims.

25. Specifically, Dr. Kyriakakis’ approach for construing “data network” involves deconstructing the term “data network” into its individual parts (i.e., “data” and “network”) and then seeking out individual definitions of each of those parts in isolation. *See, e.g.*, Kyriakakis Dec. at ¶¶ 50, 62. In my opinion, this is not how a POSITA would interpret the term “data network,” because a POSITA would understand that “data network” is a compound term having a well-understood meaning in the field and would therefore know to interpret the term “data network” as a whole consistent with that well-understood meaning in the field, instead of construing the words “data” and “network” separately as Dr. Kyriakakis has done.

26. As a result of using this improper methodology to interpret the term “data network,” Dr. Kyriakakis incorrectly concludes that the term “data network” encompasses any conceivable communication medium between devices that carries data in any form, including but not limited to (i) an infrared remote that sends infrared signals to a TV, (ii) RCA connections to speakers, and (iii) a string between two cups, among other examples provided by Dr. Kyriakakis. *See, e.g.*, Kyriakakis Dec. at ¶¶ 50, 62, 64; Appendix K [Kyriakakis Dep. Tr.] at 26:11-15, 27:5-9, 28:17-29:11, 36:3-25, 37:7-9, 38:6-23, 53:20-24, 60:18-61:2. In my opinion, no POSITA would interpret “data network” (which, again, is a coined term of art in the field of networking) in such a broad way. *See, e.g.*, Appendix L at p. 6 (Jan. 24, 2004 presentation for Cornell University “Computer Networks” class explaining a “data network . . . is NOT ‘a network that carries data’”).

27. In fact, Dr. Kyriakakis is interpreting “data network” so broadly that the meaning of that term would be no different than the meaning of the broader term “network,” but “*data*

network” is understood by a POSITA to be a narrower term than “network” that has a different (and more specific) meaning. Thus, by interpreting the term “data network” in a way that fails to preserve this well-understood distinction between “data network” and “network,” Dr. Kyriakakis is effectively reading the word “data” out of the term “data network,” which I understand to be an improper practice when interpreting patent claims.

B. Dr. Kyriakakis Ignores the Clear Intrinsic Evidence

28. In my Opening Declaration, I explained how the Zone Scene Patents repeatedly and uniformly describe the term “data network” as a medium that interconnects devices, enabling them to *send digital data packets* to *and receive digital data packets* from each other, which is directly in line with how a POSITA would have interpreted this term at the time of the inventions. *See, e.g.*, Opening Declaration at ¶¶ 59-66.

29. Notably, Dr. Kyriakakis never disputes that the Zone Scene Patents repeatedly and uniformly use the term “data network” in this way, nor does he identifies any other disclosure from the Zone Scene Patents (or any other intrinsic evidence) in support of his opinion that “data network” has a broader meaning. In fact, Dr. Kyriakakis’s “data network” section fails to even discuss the teachings of the Zone Scene Patents or any other part of the intrinsic evidence. *See* Kyriakakis Dec. at ¶¶ 60-73.

30. In my opinion, the fact that Dr. Kyriakakis ignores the intrinsic evidence of the Zone Scene Patents provides another reason why Dr. Kyriakakis’s interpretation of “data network” cannot be correct.

C. Dr. Kyriakakis’ Interpretation of “Data Network” Is Overly Broad Enough To Encompass Traditional Hard-Wired Audio Systems

31. As I previously explained in my Opening Declaration, the Zone Scene Patents are directed to a “multi-zone system” (also referred to as an “entertainment system”) comprising one

or more “zone players” (also referred to as “players” or “playback devices”) that are coupled to a “data network” and are capable of playing multimedia (such as audio) in “digital” format, which was specifically intended to advance upon a “traditional” “hard-wired” audio system connected to passive speakers via speaker wire. *See, e.g.*, ’206 Patent at 1:40-61.

32. However, as I explained above, Dr. Kyriakakis is interpreting the term “data network” so broadly that it would read on any conceivable communication medium between devices that carries data in any form. As Dr. Kyriakakis testified at his deposition, this would include any copper wiring that delivers analog audio to passive speakers within a conventional media system, such as RCA cables and traditional copper speaker wire. Appendix K [Kyriakakis Dep. Tr.] at 28:17-29:11, 49:10-23; Kyriakakis Dec. at ¶ 64.

33. Thus, under Dr. Kyriakakis’s logic, the “traditional” “hard wired” audio devices and systems of the prior art that are described in the background of the Zone Scene Patents would be operating on a “data network,” would negate the clear distinction that Zone Scene Patents draw between such “traditional” “hard wired” audio devices systems and the networked audio devices and systems that are the subject of the Zone Scene patents, which are specifically described as operating on a “data network.” In my opinion, this provides yet another reason why Dr. Kyriakakis’s interpretation of “data network” is not correct.

D. Dr. Kyriakakis Fails to Credibly Dispute that a “Data Network” Exchanges Data in the Form of Digital Data Packets

34. In his declaration, Dr. Kyriakakis opines that “the term ‘data network’ does not restrict the type of data (digital or analog) [or] the manner of transmission (packet or non-packet form).” Kyriakakis Dec. at ¶ 60. I disagree for the reasons explained in my Opening Declaration, and nothing in Dr. Kyriakakis’s declaration alters my opinion that a POSITA would

have understood that a “data network” refers to a network that exchanges data in the of digital data packets.

35. In fact, Dr. Kyriakakis’ own analysis confirms that a POSITA would understand that a “data network” carries data encoded in the form of *digital* data packets, as opposed to data encoded in analog form. For instance, as Dr. Kyriakakis acknowledges, a “data network” carries data in “discrete units” that are referred to as “packets.” Kyriakakis Dec. at ¶ 63 (“‘In the generic sense,’ packets ‘refer[] to the manner in which data are organized into *discrete units* for transmission and switching through a *data network*.’”) (bracket original).^{1, 2} And, as Dr. Kyriakakis acknowledges, it is only “digital data” that is represented in *discrete* form, whereas “analog data” is represented in continuous form. *Id.* at ¶ 62 (“Digital data is ‘data represented in *discrete, discontinuous* form, as contrasted with analog data represented in *continuous* form.’”). Thus, Dr. Kyriakakis’ own analysis confirms that a POSITA would understand a “data network” to refer to a network that carries data in “discrete units” (referred to as data “packets”), which are encoded in digital form as opposed to analog.

36. Moreover, none of examples identified by Dr. Kyriakakis in his declaration alter my opinion that a POSITA would have understood a “data network” to refer to a network that exchanges data in the form of digital data packets. *See* Kyriakakis Dec. at ¶¶ 62, 64.

37. For instance, in his declaration, Dr. Kyriakakis makes reference to non-packetized networks such as circuit-switched networks and the public switched telephone network, analog phone networks, and analog cellular networks for delivering voice calls. However, Dr.

¹ All emphases added unless otherwise indicated.

² Notably, the dictionary that Dr. Kyriakakis approvingly cites goes on to explain that, “[i]n a technology-specific sense, a packet is a data unit in an internetwork, such as the Internet or other packet-switched network” *Id.*, Ex. G (Webster’s New World Telecom Dictionary (2008)).

Kyriakakis fails to identify any evidence showing that a POSITA would have used the term “data network” at the time of the invention to refer to the types of networks he identifies.

38. I further note that non-packetized networks such as circuit-switched networks and the public switched telephone network, analog phone networks, and analog cellular networks are all examples of what a POSITA would most commonly refer to as a “voice network,” which is the primary class of networks that the term “data network” was meant to distinguish. *See, e.g.*, Appendix L at p. 6 (confirming that a “data network” is “NOT ‘a network that carries data’ and distinguishing between a “data network,” which is described as being a “euphemism for ‘packet network,’” and a “voice network,” which is described as a “euphemism for ‘circuit network’”). These definitions are confirmed by various technical sources, including some cited approvingly by Dr. Kyriakakis and identified by Google.

39. For example, *Microsoft Computer Dictionary* (2002) defines “data network” as “[a] network designed for transferring data encoded as **digital** signals, *as opposed to a voice network*, which transmits **analog** signals.” Appendix M at p. 3.

40. As another example, *Newton’s Telecom Dictionary* (2003) states that “data” is “[t]ypically anything **other than voice**.” Kyriakakis Declaration, Exhibit D at p. 103. Likewise, as shown below, *Hargrave’s Communications Dictionary* (2001) (also found in Exhibit D to Dr. Kyriakakis’ declaration) explicitly distinguishes “voice networks” from “data networks”:

Networks are often classified according to their geographic extent or according to the transmission protocol used. Some examples of voice and/or data networks include the public switched telephone network (PSTN), integrated services digital network (ISDN), Ethernet (local area network), and the Internet (a world wide computer network). See also *network classifications*.

I understand that the excerpt above from the *Hargrave's Communications Dictionary* (2001) was included in Google's Disclosure of Extrinsic Evidence for Claim Construction but was absent from Dr. Kyriakakis' Exhibit D excerpts from the same dictionary.

41. As still another example, the *Packet Broadband Network Handbook* (2004) describes a "local area network as a high-speed ***data network*** that covers a relatively small geographic area" that is "used to carry ***data traffic as opposed to voice traffic***." Opening Declaration, Appendix B at SONOS-SVG2-00018676; *see also id.* at 74 (explaining that "[b]efore packet networks, communications technology used circuit-switched telephone networks with dedicated, analog circuits," and that "[p]acket networks based on packet switching technologies represent a radical departure").

42. Dr. Kyriakakis also identifies "speakers and other devices" connected via RCA cables that can carry analog video and audio signals as somehow supporting his assertion that "some data networks" do not transfer digital data packets. Kyriakakis Dec. at ¶ 64. However, the Wikipedia page that Dr. Kyriakakis cites never refers to such RCA cables as a "data network," nor does Dr. Kyriakakis identify any other evidence showing that a POSITA at the time of the invention would have used the term "data network" to refer to RCA cables that carry analog video and audio signals. Thus, this example also does not alter my opinion that a POSITA would have understood the term "data network" to refer to a network that exchanges data in the form of digital data packets.

43. Lastly, Dr. Kyriakakis cites to the disclosures of two patent publications, U.S. Patent No. 6,829,603 filed in February 2000 and U.S. Patent Publ. No. 2003/0087636 filed in November 2001, because each of these patent publications has a passing reference to the phrase "analog data network." However, it is my opinion that these one-off uses of the phrase "analog

data network” in unrelated, extrinsic patent publications – which are not cited on the face of the Zone Scene Patents or otherwise considered to be part of the intrinsic evidence – are not consistent with or reflective of how a POSITA would have understood the plain and ordinary meaning of the term “data network” at the time of the inventions, as confirmed by the other intrinsic and extrinsic evidence for the Zone Scene Patents that I discussed before.

E. Dr. Kyriakakis Fails to Credibly Dispute that a “Data Network” Enables Two-Way Communication

44. In his declaration, Dr. Kyriakakis also asserts that “[a] person of ordinary skill in the art would understand the plain and ordinary meaning of ‘data network’ encompasses both unidirectional and bidirectional data networks such that Dr. Almeroth and Schmidt’s contention that a network requires that a device must be able to send and receive data from another device is also incorrect.” Kyriakakis Dec. at ¶ 66. I disagree for the reasons explained in my Opening Declaration, and nothing in Dr. Kyriakakis’s declaration alters my opinion that a POSITA would have understood that a “data network” enables interconnected devices to engage in two-way communication.

45. For instance, Dr. Kyriakakis asserts that “networks such as token-ring networks do not have the architecture described by Dr. Almeroth and Schmidt” because “no device both sends and receives data *directly* to and from another device.” Kyriakakis Dec. at ¶ 66. However, this is not what Sonos’s proposed construction requires. Rather, what Sonos’s proposed construction requires is a medium that interconnects devices and thereby enables them to send digital data packets to and receive digital data packets from each other, and in my opinion, token-ring networks certainly do satisfy this requirement. Thus, I fail to see how Dr. Kyriakakis’ reference to token-ring networks has any relevance to my opinions regarding the meaning of the term “data network.”

46. Further, in support of his assertion that “[v]arious publications also confirm that ‘unidirectional’ data networks were well-known in the art,” Dr. Kyriakakis makes reference to U.S. Patent No. 6,081,907 (“Witty”), which mentions “broadcast or multicast networks.” *See* Witty at 1:7-2:67. However, this Witty patent – which is not cited on the face of the Zone Scene Patents or otherwise considered to be part of the intrinsic evidence – does **not** equate these “broadcast or multicast networks” to a “data network.” *See* Witty at 1:7-2:67.

47. Instead, Witty begins by introducing the concept of “conventional computer networks,” also referred to by Witty as “data networks,” which are described as allowing “data communication in both directions between servers and clients” where “[d]igital data” is “typically packetized and sent over the network in individual packets.” *Id.* at 1:16-32:

Conventional **computer networks** are bi-directional, allowing **data communication in both directions between servers and clients**. Transmitting data over these bi-directional **data networks** has been a **mainstay of computer technology** for many years and the communication protocols are well established. . . . **Digital data**, whether transmitted over a wire-based distribution network (e.g., local area network, wide area network, cable, etc.) or a wireless distribution network (e.g., satellite, RF, paging, etc.), is typically **packetized** and sent over the network in individual packets.

48. Witty then describes a system that departs from such a “data network” by “facilitate[ing] transmission of data packets from a content server to multiple clients over a unidirectional network.” *Id.* at 1:64-66. In describing this system, Witty consistently distinguishes “data network 28” — which “represents various types of networks, including the Internet, a LAN (local area network), a WAN (wide area network), and the like” — from unidirectional “broadcast network 30,” as shown in Figure 1. *Id.* at 3:13-40, FIG. 1. There are no instances where Witty refers to unidirectional “broadcast network 30” with the well-understood term “data network” in the field of networking. Thus, contrary to Dr. Kyriakakis’ suggestion, Witty actually provides further support for Sonos’s proposed construction of “data

network” because it demonstrates that a POSITA would understand a “data network” enables devices to engage in *two-way* communication of *digital data packets*.

49. In connection with his opinion that “data networks” are not restricted to “bi-directional data networks,” Dr. Kyriakakis also makes the following statement regarding “data diodes”:

[T]hose of skill in the art recognized that networks may include “data diodes” (sometimes referred to as “unidirectional” gateways) to enforce data transfer in one direction between segments or devices of a network for example to provide additional security for the network. Ex. G (Okhravi et al., Data Diodes in Support of Trustworthy Cyber Infrastructure) at § 2 (“Data diodes provide a physical mechanism for enforcing strict unidirectional communication between two networks.”), Fig. 2 (illustrating networks connected by data diode).”

Kyriakakis Dec. at ¶ 67.

50. However, I fail to see how this discussion of “data diodes” has any relevance to the meaning of the term “data network” to a POSITA at the time of the invention, and it certainly does not alter my opinion that a POSITA would have understood that a “data network” enables interconnected devices to engage in two-way communication.

F. Conclusion Regarding “Data Network”

51. In conclusion, for at least the foregoing reasons, I disagree with virtually all of Dr. Kyriakakis’s analyses and opinions regarding “data network.” Dr. Kyriakakis fails to interpret the term “data network” as a POSITA would, ignores the intrinsic evidence of the Zone Scene Patents, and fails to support his opinions regarding the meaning of the term “data network” with any credible evidence.

VII. “ZONE CONFIGURATION” AND “GROUP CONFIGURATION” TERMS

A. Overview

52. I have been asked to review the opinions of Google’s expert, Dr. Kyriakakis, regarding the alleged indefiniteness of the terms “zone configuration” and “group configuration”

in the asserted claims of the ‘206 patent, and to provide an opinion on whether these claim terms, when read in light of the other claim language, the specification, and the prosecution history, inform, with reasonable certainty, those skilled in the art about the scope of the claimed invention.

53. I understand that the parties’ dispute centers around the following emphasized language, presented below as it appears in claim 1 of the ‘206 Patent:

1. A multimedia controller including a processor, the controller configured to:

receive, via a network interface, *a zone configuration* from a first independent playback device of a plurality of independent playback devices, wherein the zone configuration is configured via the controller and maintained at the first independent playback device, and

wherein the zone configuration characterizes one or more zone scenes, each zone scene identifying a *group configuration* associated with two or more of the plurality of independent playback devices; and

cause a selectable indication of the received zone configuration to be displayed, wherein the displayed selectable indication is selectable to cause one or more of the zone scenes to be invoked by two or more of the plurality of independent playback devices.

54. Dr. Kyriakakis opines that the terms “zone configuration” and “group configuration” are indefinite because “a POSITA would not understand how to distinguish a ‘zone configuration’ from a ‘group configuration’ or a ‘zone scene’” and would thus be unable to determine whether they “would or would not be practicing any of these independent claims.” Kyriakakis Dec. at ¶ 39.

55. I disagree with Dr. Kyriakakis’ opinion. In my opinion, the claim language identified above, when read in light of all intrinsic evidence, does inform a POSITA with reasonable certainty about the scope of the claimed invention.

B. Brief Introduction to Zone Scene Patents

56. The Zone Scene Patents are directed to a new mechanism for grouping zone players together for synchronous playback that was intended to advance upon Sonos’s prior grouping mechanism.

57. As described in the Zone Scene Patents, that prior grouping mechanism required a user to select each zone player to be included in an *ad hoc* manner, one-by-one, every time the user wished to play media in that group configuration. ‘206 Pat. at 8:7-22; *see also* Appx N, p. 30 (‘407 Provisional at Appx. A, p. 2). The Zone Scene Patents recognized, however, that this prior grouping mechanism could be inefficient and time consuming in some situations – particularly for group configurations having a larger number of zone players. ‘206 Pat. at 8:7-22 (“If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming.”).

58. To address this inefficiency, Sonos’s new grouping mechanism enables a user to (i) pre-create and pre-save a predefined group of zone players at some time prior to when the user wishes to actually play media in that group, and then (ii) when the user later wishes to play media in that group configuration, simply invoke the previously-saved group for synchronous playback without having to select the zone players to be included in the group in an *ad hoc* manner at that time. *Id.* at 8:22-36, 10:4-12, 10:21-22; Appx N, pp. 30-35. The Zone Scene Patents refer to this kind of predefined group of zone players as a “zone scene,” and teach that each zone scene comprises an identification of the particular group configuration of zone players that has been predefined and saved for later invocation (*i.e.*, the makeup of the predefined group), perhaps along with other optional settings. *Id.* at 8:22-336, 8:60-67, 10:12-19; Appx N, p. 30, 37-41.

59. The Zone Scene Patents further disclose that zone players may store configuration data for the multi-zone system that may include data characterizing previously-saved zone scenes within the system, which may then be provided to controllers of the system in order to facilitate user interaction. *Id.* at 5:51-57, 7:31-33. The Zone Scene Patents refer to this configuration data in terms of “one or more *zone configuration* files.” *Id.*

C. The Parties’ Zone Scene Proposals

60. As an initial matter, I understand that the parties are advancing different definitions of the term “zone scene” and its surrounding language in the ‘206 Patent. On the one hand, I understand that Sonos has proposed to construe “zone scene” in conjunction with the definitional language that immediately follows³ to mean “a previously-saved grouping of zone players that are to be configured for synchronous playback of media when the zone scene is invoked.” And on the other hand, I understand that Google has proposed to construe “zone scene” in isolation to mean “a group of two or more zones that are grouped according to a common theme by configuring the zones in a particular scene (e.g., morning, afternoon or garden).” Google Brief, p. 16.

61. Although the parties have not agreed on a precise definition for this term, their competing proposals reveal that they agree on certain aspects of the term. One thing the parties agree on is that the “zone scene . . .” is a coined term that does not have a well-understood definition outside of the context of these zone scene patents. Another thing the parties appear to agree on is that a “zone scene . . .” refers to a specific type of grouping of zone players, although the parties appear to disagree as to how to define that specific type of grouping. For instance, the specific grouping referred to in Sonos’s proposal is “a *previously-saved* grouping of zone players

³ I.e., the claim language “zone scene identifying a group configuration associated with two or more of the plurality of independent playback devices.”

that are *to be configured for synchronous playback of media when the zone scene is invoked.*”

On the other hand, the specific grouping referred to in Google’s proposal is “a group of two or more zones that are *grouped according to a common theme by configuring the zones in a particular scene (e.g., morning, afternoon or garden)*” (where Google has proposed that a “zone” refers to “an area or areas with one or more playback devices”).

62. In either case, however, I understand that neither party has advanced an argument that the “zone scene . . .” term renders the claims indefinite or is unable to be understood by a POSITA when read in light of the surrounding claim language and the specification.

D. The Claims Themselves Inform a POSITA About the Scope

63. In my opinion, the plain language of the claims, both when viewed on its own and in the context of the specification, informs a POSITA with reasonable certainty about the scope of the claims and the meaning and distinction between the terms used in the claims, particularly the terms “zone configuration . . .” “group configuration . . .” and “zone scene . . .” Indeed, these terms do not appear divorced or disembodied from one another in the claims. Rather, the claims use these terms, along with definitional language, in such a way as to set out a particular relationship between these terms.

64. First, the claims recite the term “zone scene” immediately followed by the definitional phrase “identifying a group configuration associated with two or more of the plurality of independent playback devices.” In the context of this claim language and the relevant disclosure in the specification, a POSITA would understand “group configuration . . .” to refer to a grouping of zone players for synchronous playback. *See, e.g.,* ‘206 Pat. at 5:43-50, 7:31-33.

65. Second, in the context of this claim language and the relevant disclosure in the specification, a POSITA would then understand “zone scene identifying a group

configuration . . .” to refer to a special kind of group configuration that is predefined and saved for later invocation such that the group configuration can be formed more efficiently. *Id.* at 8:22-36, 8:60-67, 10:4-19, 10:21-22; Appx N, p. 30-35, 37.

66. Third, the claims recite that the “zone configuration” is something that “characterizes one or more zone scenes.” Helpfully, the claim language also specifies that the “zone configuration” is received by the “controller” “via a network interface,” “configured via the controller,” and “maintained at the first independent playback device.” In the context of this claim language and the relevant disclosure in the specification – including the discussion of the “one or more zone configuration files” stored in the memory of a zone player -- a POSITA would understand “zone configuration” to refer to **configuration data** that characterizes one or more zone scenes created within a multi-zone system. *Id.* at 5:51-57, 7:31-33. In addition, a POSITA would understand what it means for data (such as the claimed “zone configuration”) to “characterize” something (such as the claimed “zone scene”). For instance, a POSITA would understand this to mean that the data “provides an **indication** of” or “provides a **characteristic** of” the thing it is characterizing. A POSITA would understand these phrases to be refer to the same thing and would understand these phrases to be interchangeable.

67. A POSITA would have no issue reasonably understanding the distinction between “zone configuration” and “zone scene” because, on the one hand, a POSITA would understand that the claimed “zone configuration” refers to configuration data, whereas on the other hand the claimed “zone scene . . .” is not limited to being a data representation. Indeed, limiting the claimed “zone scene . . .” to only a data representation of a zone scene would be inconsistent with the intrinsic evidence, which, as I lay out above, describes a zone scene as a previously-saved, predefined group configuration that is framed from the perspective of a user

rather than being limited only to its representation in computer data. *Id.* at 8:19-36, 10:4-10, 10:21-22.

68. Moreover, a POSITA would have no issue reasonably understanding the distinction between these terms for at least the additional reason that the claim expressly recites a relationship between “zone configuration” and “zone scene”, namely that the “zone configuration” characterizes one or more zone scenes. In this way, the claim specifies at least one thing that the zone configuration needs to do: characterize at least one zone scene. But the claim recites no limitation on the number of other things the zone configuration may do, such as characterize or otherwise identify other things related to the multi-zone system. Indeed, the claim language allows for the zone configuration to characterize things like a second, third, or more zone scenes, or even other information about the multizone system or the zone players that comprise it. Thus, it would make no sense to conclude that the claimed “zone configuration” is synonymous with the claimed “zone scene” for at least the reason that the claimed “zone configuration” may characterize or identify other things including *more* than one zone scene. Accordingly, it would not be reasonable for a POSITA to conclude that something that can characterize more than one thing (like the claimed “zone configuration”) to be synonymous with any one of those individual thing that is characterized (like one of the claimed “one or more zone scenes”).

69. A POSITA would have no issue reasonably understanding the distinction between “zone configuration” and “group configuration” either. For a similar reason as above, a POSITA would have no reason to conflate the claimed “zone configuration” (which, as claimed, can characterize *more* than one zone scene (i.e., more than one predefined grouping of zone players)) with a “group configuration,” which appears in the claim as part of a single definitional phrase

intended to collectively define the confines of the claimed “zone scene.” In this way, a POSITA would understand the “group configuration” portion of the definitional phrase defining “zone scene ...” to refer to a grouping of zone players for synchronous playback.

70. Given the foregoing, it is my opinion that the language of the claims provides an ample basis from which a POSITA would reasonably understand the scope of the claims. Dr. Kyriakakis’ opinion is fundamentally flawed because he makes no attempt to opine on or analyze a POSITA’s understanding or approach to construing the claim terms based on the language of the claims themselves. For instance, Dr. Kyriakakis does not consider the full scope of the claim terms provided by the express language of the claims, and thus does not consider the situation where a zone configuration might characterize, for instance, multiple zone scenes or that the claimed “zone scene ...” is not limited to being a data representation of a zone scene. In view of this failure, he does not explain how or why or how a POSITA would have considered the claimed “zone configuration” to be synonymous with the claimed “zone scene ...” or with any single one of the possible multiple zone scenes characterized by the “zone configuration.”

E. The Specification Supports a POSITA’s Understanding of the Scope of the Claims

71. Instead of considering the full scope of the claim terms provided by the express language of the claims, Dr. Kyriakakis jumps right to the specification and concludes that the specification confuses the claim terms. In my opinion, as I expressed above, this is an inappropriate and incomplete way to analyze a POSITA’s understanding of the claim terms because it skips the crucial step described above – analysis of the claim terms based on the claim language themselves. Notwithstanding, the specification is consistent with and further supports a POSITA’s understanding of the claim terms based on the language.

72. Dr. Kyriakakis opines that the specification conflates or confuses the terms “zone configuration” and “group configuration.” I disagree. The terms “zone configuration” and “group configuration” are not used in the specification (or the claims) in isolation – let alone synonymously. Rather, the specification teaches an example in which the “the memory 206 [of zone player 200] is used to save one or more saved *zone configuration files* that may be retrieved for modification at any time,” and that “[t]ypically, a *saved zone group configuration file* is transmitted to a controller . . . when a user operates the controlling device.” ‘206 Pat. at 5:51-57. This teaching does not convey to a POSITA that the claimed “zone configuration” and the claimed “group configuration” refer to the same thing. To the contrary, a POSITA would have understood this teaching to convey the notion of a “zone configuration,” being maintained or stored in memory of a zone player in the form of a file and transmitted from time to time to a controller device – which confirms a POSITA’s understanding that the claim term “zone configuration” refers to configuration data. Indeed, the example embodiment of the “zone configuration” is a “zone configuration file,” which may take the form of a “zone group configuration file.” A POSITA would have understood the reference to “file” to refer to a specific format, arrangement, or collection of “data” stored in these examples in the memory of a zone player, particularly because the specification teaches that the zone players are data network devices with processors and memory storage. *E.g., id.* at 5:11-50, FIG. 2A. In this way, it would be clear to a POSITA that a “zone group configuration file” is something different than an identification of a group configuration associated with two or more zone players, such as recited in the claims.

73. Dr. Kyriakakis opines that the specification confuses the terms “zone configuration” and “zone scene.” Kyriakakis Dec. at ¶ 40. I disagree. First, as I explained

above, “zone configuration” is not used in isolation in the specification – the specification uses the phrase “zone configuration *file*.” ‘206 Pat. at 5:51-53. Second, the specification introduces “zone configuration file” prior to introducing and discussing the “zone scene” technology.

Compare id. at 5:51-53 *with id.* at 8:7-28. For these reasons, a POSITA would have no reason to think that the claimed “zone configuration”—and its attendant requirements of (1) being maintained at a zone player (2) received by the claimed “controller” via a network interface, and (3) characterizing one *or more* zone scenes—would constitute the same thing as the zone scene itself. Rather, a POSITA, would readily understand that the claimed “zone scene” refers to a previously-saved grouping of zone players and the claimed “zone configuration” refers to data that characterizes one or more claimed zone scenes, i.e., data that characterizes one or more particular pre-defined, previously-saved groupings of zone players. No part of the specification alters this understanding of the express language of the claims.

74. Further, Dr. Kyriakakis agrees with me that a POSITA has at least an undergraduate degree in electrical engineering or computer science and 2-4 years working experience, although we disagree on the precise fields in which that 2-4 years’ working experience is. *Compare* Kyriakakis Dec. at ¶ 31 *with* Almeroth Opening Dec. at ¶ 37. Under either definition however, a POSITA has at least a college degree in electrical engineering or computer science *and* work experience in a field related to networking or “data communications.” Such a person would have no issue understanding what it means for data (such as a “file”) to “characterize” something. For instance, data characterizes something when it “identifies” or “describes” that something. Indeed, a POSITA would not conflate the data itself with the thing represented by the data.

75. Dr. Kyriakakis opines that FIG. 3A confuses the terms “zone configuration” and “zone scene” for the sole reason that the figure includes a bracket and then the phrase “Zone Configuration/Scene.” However, as before, Dr. Kyriakakis makes no attempt to analyze this figure in the context in which it is described in the specification or in light of the express language of the claims. Dr. Kyriakakis thus overlooked or ignored the specification’s earlier discussion of the one or more “zone configuration files” stored in the memory of a zone player, which is undeniably a description of configuration data and provides a clear distinction from the concept of a “zone scene” that is later disclosed in the specification. *Compare* ‘206 Pat. at 5:51-53 *with id.* at 8:7-36. Given the totality of the specification (including that FIG. 3A is first discussed in the portion of the specification describing zone scenes) and particularly the operative claim language specifying that the “zone configuration characterizes one or more zone scenes” a POSITA would not have understood this graphical representation of a group to mean that “zone configuration” and “zone scene” are the same thing. To the contrary, a POSITA would understand that FIG. 3A is visually demonstrating that this specific group of zone players (i.e., the “Bedroom” zone player, “Den” zone player, and “Dining Room” zone player) can be saved using the disclosed zone scene technology and can thus be represented by the previously-discussed “zone configuration” data (which as claimed may also represent other zone scenes too). *Id.* at 8:7-36, FIG. 3A.

76. In view of the foregoing, it is my opinion that the claims, when read in light of all intrinsic evidence, inform a POSITA with reasonable certainty about the scope of the claimed invention.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief

Dated: June 15, 2021

By: Kevin C Almeroth
Kevin C. Almeroth

Appendix K

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

SONOS, INC.,)
)
)
Plaintiff,) Civil Action No.
) 6:20-cv-00881-ADA
vs.)
)
GOOGLE, LLC,)
)
Defendant.)

VIDEOCONFERENCE DEPOSITION OF CHRISTOS KYRIAKAKIS

Friday, June 11, 2021

Volume I

Reported by:
KATHLEEN E. BARNEY
CSR No. 5698
Job No. 4626386
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1 Exhibit 13 Dua Patent Application 159	1 from Lee Sullivan Shea & Smith.
2 Publication	2 MR. KAPLAN: This is Marc Kaplan from Quinn
3	3 Emanuel Urquhart & Sullivan for Google and the
4 Exhibit 14 '033 patent 196	4 witness.
5	5 MR. LEE: Good morning. This is George Lee 09:03:52
6	6 for plaintiff Sonos. I'm also with the firm of Lee
7	7 Sullivan Shea & Smith in Chicago.
8	8 THE VIDEOGRAPHER: Thank you. Will the court
9	9 reporter please swear in the witness.
10	10
11	11 CHRISTOS KYRIAKAKIS,
12	12 having been administered an oath, was examined and
13	13 testified as follows:
14	14
15	15 EXAMINATION
16	16 BY MR. PAK:
17	17 Q Dr. Kyriakakis, could you please state and
18	18 spell your name for the record.
19	19 A Sure. First name is -- legal first name is
20	20 Christos, but I go by Chris, last name is 09:04:34
21	21 K-Y-R-I-A-K-A-K-I-S.
22	22 Q Is it okay if I call you Dr. K throughout
23	23 this deposition?
24	24 A Yes, please do.
25	25 Q Have you been deposed before? 09:04:48
Page 6	Page 8
1 Friday, June 11, 2021	1 A I have.
2 9:02 a.m.	2 Q How many times have you been deposed? Just a
3	3 ballpark is fine.
4 THE VIDEOGRAPHER: Good morning. We are on	4 A Two other times.
5 the record at 9:02 a.m. on June 11, 2021. 09:02:30	5 Q How many times have you been deposed as an 09:04:57
6 All participants are appearing remotely.	6 expert witness? Were you an expert witness in both
7 Audio and video recording will continue to take	7 of those cases?
8 place unless all parties agree to go off the record.	8 A Yes, I was.
9 This is Media Unit 1 of the recorded	9 Q And these are patent cases, correct?
10 deposition of Christos Kyriakakis taken by counsel 09:02:49	10 A Correct. 09:05:16
11 for the plaintiff in the matter of Sonos, Inc.,	11 Q When was the last time you were deposed?
12 versus Google, LLC, filed in the U.S. District	12 A It was -- I think it was 2018. I don't have
13 Court, Western District of Texas, Waco Division,	13 the exact date, but I think it was 2018.
14 case number 6:20-CV-00881-ADA.	14 Q Sure. Do you remember what case that was?
15 My name is Kimberlee Decker from Veritext 09:03:12	15 A It was -- so it was two in that same year. 09:05:34
16 Legal Solutions. I'm the videographer. The court	16 So one of them was -- I was working on behalf of
17 reporter is Kathy Barney. I'm not related to any	17 Apple, which was an ITC case. Actually, initially
18 party in this action, nor am I financially	18 the case involved Apple and Samsung as
19 interested in the outcome.	19 co-defendants. So that was one case. And the other
20 Counsel and all present will now state their 09:03:26	20 case was for Apple, a separate case. 09:06:05
21 appearances and affiliations for the record. If	21 Q Okay. And so we're on the same page, I want
22 there are any objections to proceeding, please state	22 to run through some general guidelines. So just
23 them at the time of your appearance, beginning with	23 bear with me here.
24 the noticing attorney.	24 I'll ask you questions and you must give
25 MR. PAK: This is Jae Pak, counsel for Sonos, 09:03:33	25 truthful answers. Your counsel may object to 09:06:20
Page 7	Page 9

<p>1 questions, but unless your counsel instructs you not 2 to answer, you still must answer despite the 3 objection.</p> <p>4 Do you understand?</p> <p>5 A I do. 09:06:30</p> <p>6 Q And if you don't understand a question or 7 need clarification, please ask. Otherwise I'll 8 assume that you understand the question.</p> <p>9 We'll plan to take a break every hour or so.</p> <p>10 If you need a break outside of that schedule, just 09:06:38 11 let me know and I'll accommodate the request. The 12 only thing I ask is, you know, to finish any pending 13 question before we go on break.</p> <p>14 And the court reporter will be transcribing 15 our discussion today, so I need you to give verbal 09:06:50 16 answers as opposed to head nods or the like.</p> <p>17 Understood?</p> <p>18 A Yes.</p> <p>19 Q Okay. I'll slow down here now.</p> <p>20 When did you begin working on this case 09:07:02 21 between Sonos and Google?</p> <p>22 A Oh, I don't know the exact date. It was a 23 few months ago.</p> <p>24 Q Okay. So it was sometime this year?</p> <p>25 A Yes. 09:07:16</p> <p style="text-align: right;">Page 10</p>	<p>1 A Probably two other times. It was different 2 attorneys. Different matters.</p> <p>3 Q What was the nature of your engagement with 4 Quinn Emanuel?</p> <p>5 MR. KAPLAN: Object to form. 09:08:33</p> <p>6 THE WITNESS: It was similar. They were 7 patent cases and I was an expert witness for their 8 client.</p> <p>9 BY MR. PAK:</p> <p>10 Q Do you recall what cases? 09:08:43</p> <p>11 A I believe one was Blitzsafe versus Daimler 12 Benz, Mercedes. And the other one escapes me 13 because I remember the cases, but not necessarily 14 all the affiliations.</p> <p>15 THE VIDEOGRAPHER: You're speaking a little 09:09:26 16 low.</p> <p>17 THE WITNESS: Interesting. Okay. Is that 18 better?</p> <p>19 BY MR. PAK:</p> <p>20 Q Have you provided expert opinions on behalf 09:09:44 21 of Google before?</p> <p>22 A I have not.</p> <p>23 Q Have you offered opinions with respect to any 24 Google products?</p> <p>25 A No. 09:09:55</p> <p style="text-align: right;">Page 12</p>
<p>1 Q Did you sign an engagement letter?</p> <p>2 A I did.</p> <p>3 Q And when did you sign the engagement letter, 4 do you remember?</p> <p>5 A Shortly after I talked to the attorneys and I 09:07:29 6 was told they wanted to retain me. I don't have the 7 exact date. I think it was a few months ago.</p> <p>8 Q Few months as in maybe April of this year or 9 sometime before?</p> <p>10 A I'm pretty sure it was before. 09:07:45</p> <p>11 Q Okay.</p> <p>12 A I don't have the exact date.</p> <p>13 Q No, I understand.</p> <p>14 Who is that engagement between? Is that 15 between you and Google or Google's counsel or 09:07:57 16 someone else?</p> <p>17 A It is -- I believe it's between me and 18 Google's counsel.</p> <p>19 Q And Google's counsel being Quinn Emanuel; is 20 that correct?</p> <p>21 A Correct.</p> <p>22 Q Have you worked with Quinn Emanuel before?</p> <p>23 A I have.</p> <p>24 Q How many times have you worked with Quinn 25 Emanuel? 09:08:18</p> <p style="text-align: right;">Page 11</p>	<p>1 Q Have you offered opinions with respect to any 2 mobile apps that can be installed on your phone or 3 tablet?</p> <p>4 A No.</p> <p>5 Q Have you used any Google audio products 09:10:07 6 before?</p> <p>7 A I have -- yes, I have used them. I don't own 8 them, but I have used them.</p> <p>9 Q What products have you used?</p> <p>10 A It was a Google speaker. 09:10:22</p> <p>11 Q Do you know what speaker it was?</p> <p>12 A I think it's called Google Home.</p> <p>13 Q Did you use any specific feature of Google 14 Home?</p> <p>15 A I was interested in evaluating the voice 09:10:45 16 performance, the voice recognition performance, 17 especially how it performs in noisy environments.</p> <p>18 Q So you've experimented with Google Assistant; 19 is that correct?</p> <p>20 MR. KAPLAN: Object to form. 09:11:12</p> <p>21 THE WITNESS: In the context of that product, 22 yes.</p> <p>23 BY MR. PAK:</p> <p>24 Q Okay. Have you used the Google Home app 25 before? 09:11:24</p> <p style="text-align: right;">Page 13</p>

<p>1 A No.</p> <p>2 Q So how did you set up the Google Home</p> <p>3 product?</p> <p>4 A That's a good question. It's been a while.</p> <p>5 Okay. I guess I used it to set it up. I 09:11:40</p> <p>6 thought you were asking if I used it to interact</p> <p>7 with it.</p> <p>8 Q Okay. Have you used any Google Pixel device</p> <p>9 before?</p> <p>10 A No. 09:11:53</p> <p>11 Q Have you used any Sonos products?</p> <p>12 A Yes.</p> <p>13 Q What Sonos products have you used before?</p> <p>14 A Sonos Play:1. And Sonos Subwoofer.</p> <p>15 Q Have you used any other Sonos products 09:12:17</p> <p>16 before?</p> <p>17 A No.</p> <p>18 Q Do you own a Sonos Play:1 or Sonos Sub?</p> <p>19 A Yes, I do.</p> <p>20 Q When did you first purchase the Play:1 and 09:12:33</p> <p>21 the Sonos Sub?</p> <p>22 A Two years ago approximately.</p> <p>23 Q Why did you purchase the Play:1 and Sonos</p> <p>24 Sub?</p> <p>25 A As part of my work and research, I have, I 09:12:59</p> <p style="text-align: right;">Page 14</p>	<p>1 I mean, that's kind of what I do on a regular</p> <p>2 basis just to understand what is going on and who is</p> <p>3 doing what acoustically in rooms.</p> <p>4 BY MR. PAK:</p> <p>5 Q So have you evaluated these products for 09:15:04</p> <p>6 other reasons? Other than acoustic performance,</p> <p>7 have you evaluated these products for some other</p> <p>8 reason?</p> <p>9 A No.</p> <p>10 Q And just for curiosity, I guess, which 09:15:15</p> <p>11 product has the best acoustic performance, in your</p> <p>12 opinion?</p> <p>13 A I'm going to get in big trouble. I'm not</p> <p>14 going to answer that. A lot of them it's an</p> <p>15 objective measurement, but a lot of it is very 09:15:35</p> <p>16 subjective. So I'm probably going to stay away from</p> <p>17 that one.</p> <p>18 Q That's fair.</p> <p>19 I want to talk about your professional</p> <p>20 experience. Do you have any computer programming 09:15:46</p> <p>21 experience?</p> <p>22 A Yes.</p> <p>23 Q Do you remember the last time you coded or</p> <p>24 programmed something?</p> <p>25 A Two days ago. 09:15:59</p> <p style="text-align: right;">Page 16</p>
<p>1 would say, an unusually large collection of speaker</p> <p>2 products and I've purchased them to evaluate their</p> <p>3 acoustic performance, compare them to others, and so</p> <p>4 on.</p> <p>5 Q Do you own more than one Play:1 and more than 09:13:16</p> <p>6 one Sonos Sub?</p> <p>7 A I have three Play:1s and one Sonos Sub.</p> <p>8 Q Have you ever stereo-paired two Play:1s</p> <p>9 together?</p> <p>10 A Yes. Yes, I have. 09:13:47</p> <p>11 Q And have you compared that to other -- when</p> <p>12 you say others, you're talking about other audio</p> <p>13 products?</p> <p>14 A I guess what do you mean by "compared"?</p> <p>15 Q Yeah. So you said you evaluated the acoustic 09:14:09</p> <p>16 performance of the Sonos Play:1 products with</p> <p>17 others, right?</p> <p>18 A Yes.</p> <p>19 Q And who are these others that you're</p> <p>20 referring to here? 09:14:23</p> <p>21 MR. KAPLAN: Object to form.</p> <p>22 THE WITNESS: There's a number of them. Some</p> <p>23 are home speakers. PSB. Bose. Amazon products.</p> <p>24 Paradigm is a high-end company that makes wireless</p> <p>25 speakers. A number of others. 09:14:51</p> <p style="text-align: right;">Page 15</p>	<p>1 Q Got it.</p> <p>2 Have you taught any computer science courses</p> <p>3 before?</p> <p>4 A No.</p> <p>5 Q Have you taught any network courses before? 09:16:09</p> <p>6 A Network specific, no.</p> <p>7 I should mention I have computer science</p> <p>8 students in my courses, but they're not specific</p> <p>9 under the computer science department.</p> <p>10 Q Got it. But you haven't taught any computer 09:16:24</p> <p>11 science courses. Did you say you haven't taught any</p> <p>12 network courses; is that correct?</p> <p>13 A That's correct.</p> <p>14 Q Do you have any networking experience?</p> <p>15 A Yes. Quite a bit, especially with streaming 09:16:41</p> <p>16 media. My research group was one of the first to</p> <p>17 implement multichannel audio streaming across the</p> <p>18 country over Internet2, and for that we had a large</p> <p>19 group that was working on various aspects of</p> <p>20 networking, including peer to peer and other aspects 09:17:05</p> <p>21 of it. So, yeah, quite a bit of experience.</p> <p>22 Q What is Internet2?</p> <p>23 A Internet2 is what the internet was when it</p> <p>24 first started, which is a network that was closed</p> <p>25 off to the public and only open to academic and 09:17:24</p> <p style="text-align: right;">Page 17</p>

<p>1 research institutions. It's a much higher bandwidth 2 network that is basically used for experimentation 3 for next-generation applications on the internet. 4 Q So do you have any experience in designing or 5 implementing a network? 09:17:48 6 A My experience is in coding, testing 7 performance of networks, not necessarily designing 8 networks from scratch. Software that goes on 9 networks, though, yes. 10 Q But you never designed or architected a 09:18:11 11 network, right? Is that right? 12 MR. KAPLAN: Object to form. 13 THE WITNESS: Well, I guess I'm -- 14 architected -- I was part of the team. I led the 15 team that architected a multichannel audio streaming 09:18:34 16 solution, Lossless, over a network. And so I didn't 17 build the network from scratch. It was an existing 18 network. We just built the software to run all of 19 that. 20 BY MR. PAK: 09:19:01 21 Q Got it. 22 And you're the founder and CTO of a company 23 called Audyssey Laboratories; is that correct? 24 A That's right. 25 Q And I see the background. Is that an 09:19:07 Page 18</p>	<p>1 themselves inside the stores like the Apple Store 2 and Best Buy. 3 Q Do you know any Audyssey -- do you know the 4 product names of any of the Audyssey products? 5 A The loudspeakers? 09:21:02 6 Q Yes. Any Audyssey product, really. 7 A So the main Audyssey product was called 8 MultEQ, M-U-L-T-E-Q. That was the name of the 9 umbrella of technologies that had to do with 10 acquiring in-room information, acoustical 09:21:21 11 information, and correcting it. And the logo is 12 still found on many receivers like Marantz and 13 Denon, D-E-N-O-N. 14 The speaker products had -- were named of 15 after interesting, hip neighborhoods. That was the 09:21:51 16 marketing plan. So Lower East Side, Market -- South 17 of Market. Yeah. 18 Q Are you familiar with the Audyssey Sub 19 Equalizer product? 20 A I am, yes. 09:22:19 21 Q What is a sub equalizer? 22 A A sub equalizer -- so in the home theater 23 market, it is popular to have separate components 24 for audio systems. So people will buy their 25 favorite loudspeakers, they will buy their favorite 09:22:39 Page 20</p>
<p>1 Audyssey Laboratories product behind you? 2 A The loud speaker, no. 3 Q No? 4 A No, it's not. I have one, but it's not in 5 this room. 09:19:21 6 Q What products did you help design at 7 Audyssey? 8 A So Audyssey was a spinout from my research 9 lab at USC with a couple of graduate students. We 10 started in the audio technology licensing business, 09:19:36 11 and so the product there was technologies for 12 automatic measuring of acoustical problems in rooms 13 and solutions for fixing them. And perhaps you've 14 seen the little microphone that comes with home 15 theater equipment. You put it in your living room 09:20:01 16 or your car or IMAX theaters, for example. There 17 are many places that have that. 18 So it started as a software solution that was 19 being licensed. In the course of that company, we 20 also designed some loudspeaker products to showcase 09:20:23 21 the technologies so that we could be fully in 22 control of them. 23 And these were wireless speakers. Three were 24 wireless and one was wired. And so those were -- 25 those were the physical products that found 09:20:48 Page 19</p>	<p>1 audio receiver amplifier. 2 And for people that already had invested 3 money in a product that didn't have Audyssey room 4 correction in it, we actually made two products. 5 One was called the Audyssey Equalizer, which allowed 09:22:51 6 you to insert it in the path, in the audio path, and 7 take advantage of the Audyssey technologies. 8 And the sub equalizer was basically the same 9 thing except it was only focused on room correction 10 of the subwoofer frequency range, the low 09:23:15 11 frequencies. 12 Q Got it. 13 And I want to introduce an exhibit here. 14 It's the Audyssey manual. And I just uploaded it in 15 the exhibits folder and marked it as Exhibit 1. 09:23:28 16 (Exhibit 1 was marked for identification 17 electronically and is attached hereto.) 18 BY MR. PAK: 19 Q Do you see that? 20 A Not yet. I'm refreshing the screen here. 09:23:34 21 I'm looking at another monitor, so -- 22 Q Sure. I am too. 23 THE VIDEOGRAPHER: You have to refresh the 24 browser each time. 25 MR. KAPLAN: Chris, sometimes you can just 09:24:02 Page 21</p>

<p>1 hit the Marked Exhibits folder again and that will 2 do it.</p> <p>3 THE WITNESS: Oh, there it is. Okay. I got 4 it. I'm opening it now.</p> <p>5 BY MR. PAK: 09:24:17</p> <p>6 Q Do you recognize this document?</p> <p>7 A Sorry, it hasn't opened yet.</p> <p>8 Q Sure. Let me know.</p> <p>9 A Okay. Yes, it's open now.</p> <p>10 Yes, I recognize it. 09:24:26</p> <p>11 Q Okay. And this is the Audyssey MultEQ Pro 12 User Guide, correct?</p> <p>13 A Correct, MultEQ Pro. It was software that we 14 provided to home theater installers. And this was 15 additional functionality than what a consumer could 09:24:45 16 do with the built-in software. And we marketed it 17 as MultEQ Pro.</p> <p>18 Q I want to turn to PDF, page 14. And there's 19 a connection diagram for the Audyssey Sub Equalizer.</p> <p>20 Do you see that? 09:25:02</p> <p>21 A It's coming. Page 14?</p> <p>22 Q PDF page 14.</p> <p>23 A Oh, PDF page 14.</p> <p>24 Q But it's page 10 of the manual.</p> <p>25 A Okay. 09:25:26</p> <p style="text-align: right;">Page 22</p>	<p>1 data after processing it.</p> <p>2 Q Well, let me ask you this. The Sub Equalizer 3 was not designed to communicate over Wi-Fi, 4 Bluetooth, or Ethernet. How did it communicate over 5 a data network? 09:27:01</p> <p>6 MR. KAPLAN: Object to form.</p> <p>7 THE WITNESS: Well, those are not the only 8 types of networks. Anything that carries data is a 9 data network. So this is an audio data network.</p> <p>10 BY MR. PAK: 09:27:11</p> <p>11 Q You're saying these speakers -- how are these 12 speakers connected to the Sub Equalizer?</p> <p>13 A Through audio cables.</p> <p>14 Q What kind of -- sorry, I didn't mean to cut 15 you off. 09:27:27</p> <p>16 A No, no. It's fine.</p> <p>17 Q What audio cables do you use to connect, you 18 know, one of these speakers to a Sub Equalizer?</p> <p>19 A They're called line level cables or RCA 20 because of the type of connector, which is named as 09:27:46 21 an RCA connector.</p> <p>22 Q So if you have a speaker connected to, you 23 know, another device, you know, another device here 24 being a Sub Equalizer via RCA cables, are they 25 communicating over a data network? 09:28:06</p> <p style="text-align: right;">Page 24</p>
<p>1 Q Okay. So you see the connection diagram for 2 the Audyssey --</p> <p>3 A Yes.</p> <p>4 Q Does that look like an accurate 5 representation of the Sub Equalizer? 09:25:33</p> <p>6 MR. KAPLAN: Object to form.</p> <p>7 THE WITNESS: It's an accurate representation 8 of how we recommended the connection, yes.</p> <p>9 BY MR. PAK:</p> <p>10 Q Was the Sub Equalizer designed to communicate 09:25:48 11 over Wi-Fi?</p> <p>12 A No.</p> <p>13 Q Was the Sub Equalizer designed to communicate 14 over Bluetooth?</p> <p>15 A No. 09:25:58</p> <p>16 Q Was the Sub Equalizer designed to communicate 17 over Ethernet?</p> <p>18 A No.</p> <p>19 Q Was the Sub Equalizer designed to communicate 20 over a data network? 09:26:09</p> <p>21 A Well, it was designed to accept, process and 22 produce or transmit audio data.</p> <p>23 So in the context of data -- audio being 24 data, which it is, I would say yes, it's connected 25 to two devices as shown here and it's passing audio 09:26:30</p> <p style="text-align: right;">Page 23</p>	<p>1 A In the most general definition of a data 2 network, audio certainly falls into that. And I 3 would consider this a wired data network. To put it 4 in the context of the discussion we're having today, 5 yes. 09:28:27</p> <p>6 Q Okay. So, I mean, any device that can carry 7 data to another device is a data network; is that 8 correct?</p> <p>9 MR. KAPLAN: Object to form.</p> <p>10 THE WITNESS: Any infrastructure that can 09:28:37 11 connect devices and carry data, yes.</p> <p>12 BY MR. PAK:</p> <p>13 Q In general, do you have an understanding of 14 what a term of art is?</p> <p>15 A Yes. 09:28:53</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 BY MR. PAK:</p> <p>18 Q What is your understanding?</p> <p>19 A A term of art in my understanding is -- maybe 20 not the exact legal definition -- it's what a person 09:29:05 21 of skill would understand that to mean in the art, 22 in the field.</p> <p>23 Q Is the term "network" a term of art?</p> <p>24 MR. KAPLAN: Object to form.</p> <p>25 THE WITNESS: Yes. 09:29:25</p> <p style="text-align: right;">Page 25</p>

<p>1 BY MR. PAK:</p> <p>2 Q Before you were engaged as an expert for this</p> <p>3 matter, did you have an understanding of what</p> <p>4 network means?</p> <p>5 A Yes. 09:29:34</p> <p>6 Q What was that understanding?</p> <p>7 A Basically what I said a minute ago. A</p> <p>8 network is an infrastructure of devices and</p> <p>9 interconnects that allows the flow of data between</p> <p>10 them. Or enables the flow of data between them. 09:29:54</p> <p>11 Q Okay. So your definition of a network is the</p> <p>12 same as a data network; is that correct?</p> <p>13 MR. KAPLAN: Object to form.</p> <p>14 THE WITNESS: I think -- a network carries</p> <p>15 data, so yes. 09:30:19</p> <p>16 BY MR. PAK:</p> <p>17 Q Is "data" a term of art?</p> <p>18 A Yes, it is.</p> <p>19 Q Before Google engaged you as an expert in</p> <p>20 this matter, did you have an understanding of what 09:30:41</p> <p>21 data means?</p> <p>22 A Yes, absolutely.</p> <p>23 Q What was that understanding?</p> <p>24 A Data is in its -- in the highest level</p> <p>25 definition, data is information. 09:30:53</p> <p style="text-align: right;">Page 26</p>	<p>1 laptops on a data network, correct?</p> <p>2 A Correct.</p> <p>3 Q Are there any other types of devices other</p> <p>4 than a laptop that can be on a data network?</p> <p>5 A Anything that allows the passage of data 09:32:45</p> <p>6 through it that is connected to other devices can be</p> <p>7 on a data network.</p> <p>8 So in a studio environment, microphones and</p> <p>9 loudspeakers are on a data network, and sometimes</p> <p>10 over very long distances. The control room is in 09:33:06</p> <p>11 another place. Obviously computers are on a data</p> <p>12 network. Cell phones are on a data network. Yes.</p> <p>13 And many other types of devices.</p> <p>14 Q Sure. And a data network can be wired or</p> <p>15 wireless, correct? 09:33:26</p> <p>16 A Correct.</p> <p>17 Q What are the types of cables or interfaces to</p> <p>18 transfer data over a wired data network?</p> <p>19 MR. KAPLAN: Object to form.</p> <p>20 THE WITNESS: Over wired? 09:33:39</p> <p>21 BY MR. PAK:</p> <p>22 Q Yes. I -- well, I assume in a wireless data</p> <p>23 network you wouldn't need cables, right?</p> <p>24 A Right. Correct.</p> <p>25 In a wired one, I mean, I guess anything that 09:33:51</p> <p style="text-align: right;">Page 28</p>
<p>1 Q Can data be analog or digital?</p> <p>2 A Yes, absolutely.</p> <p>3 Q Is "data network" a term of art?</p> <p>4 A I would say yes.</p> <p>5 Q Is there a difference between a network and a 09:31:18</p> <p>6 data network?</p> <p>7 MR. KAPLAN: Object to form.</p> <p>8 THE WITNESS: In the context of what we're</p> <p>9 speaking of, I would say no. There is a network of</p> <p>10 people that I have on LinkedIn, but that's a 09:31:35</p> <p>11 different kind of network. But in this context, I</p> <p>12 would say no.</p> <p>13 BY MR. PAK:</p> <p>14 Q Would you say that a network and a data</p> <p>15 network are both mediums that carry data? 09:31:54</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 THE WITNESS: In this context, yes.</p> <p>18 BY MR. PAK:</p> <p>19 Q Okay. What are the types of devices that can</p> <p>20 be on a data network? 09:32:15</p> <p>21 MR. KAPLAN: Object to form.</p> <p>22 THE WITNESS: The types? What do you mean by</p> <p>23 "types"?</p> <p>24 BY MR. PAK:</p> <p>25 Q Well, for example, you can have a laptop or 09:32:29</p> <p style="text-align: right;">Page 27</p>	<p>1 can establish electrical connection. So it would</p> <p>2 be -- it could be copper, it could be optical, it</p> <p>3 could be Ethernet. There's probably others that I'm</p> <p>4 forgetting, but --</p> <p>5 Q You mentioned earlier RCA cables, you can use 09:34:20</p> <p>6 an RCA cable to --</p> <p>7 A Yeah. Those fall into copper for me, but</p> <p>8 yes.</p> <p>9 Q Got it. What about speaker wires, does that</p> <p>10 fall under copper? 09:34:33</p> <p>11 A Also under copper.</p> <p>12 Q Does a data network require devices to</p> <p>13 transfer data in a certain format to communicate</p> <p>14 with another device that is on the network?</p> <p>15 A There has to be -- the devices have to 09:34:47</p> <p>16 understand the data coming in. So if that is what</p> <p>17 you mean by format, then yes. If not, there are</p> <p>18 translator devices that can convert it.</p> <p>19 Q Okay. So when a device transfers data to</p> <p>20 another device on a data network, there's got to be 09:35:14</p> <p>21 some kind of protocol, right?</p> <p>22 A Yes.</p> <p>23 MR. KAPLAN: Object to form.</p> <p>24 BY MR. PAK:</p> <p>25 Q What are the protocols that are required for 09:35:25</p> <p style="text-align: right;">Page 29</p>

<p>1 a data network?</p> <p>2 A There's a pretty large number of them. A</p> <p>3 common protocol is to -- is based on the principal</p> <p>4 of modulation. Again, I'm speaking in the context</p> <p>5 of our discussion today and the matters here. 09:35:45</p> <p>6 So in a modulation concept, the modulation</p> <p>7 type protocol is understood to take in data, put it</p> <p>8 in a certain form so that the receiving device can</p> <p>9 understand it. Since we're speaking of audio, pulse</p> <p>10 code modulation is a common one. 09:36:14</p> <p>11 There are optical protocols called SPDIF,</p> <p>12 Sony Phillips Digital Interchange Format. There</p> <p>13 are, of course, computer-to-computer protocols such</p> <p>14 as Ethernet. And several others.</p> <p>15 Q Okay. Specifically if a device wants to 09:36:49</p> <p>16 communicate with another device on an internet-based</p> <p>17 network, what protocols are required for that</p> <p>18 communication?</p> <p>19 MR. KAPLAN: Object to form.</p> <p>20 THE WITNESS: Can you define internet-based 09:37:10</p> <p>21 network for me, please?</p> <p>22 BY MR. PAK:</p> <p>23 Q Yeah. So communicate over Wi-Fi or Ethernet,</p> <p>24 for example.</p> <p>25 MR. KAPLAN: Object to form. 09:37:20</p> <p style="text-align: right;">Page 30</p>	<p>1 than 802.11?</p> <p>2 A Well, there are other Wi-Fi methods that are</p> <p>3 proprietary to individual companies that may -- that</p> <p>4 don't have to comply with 802.11 between their own</p> <p>5 devices. I don't know how they work because they're 09:39:45</p> <p>6 proprietary, but they do exist.</p> <p>7 Q And these protocols you mentioned, like</p> <p>8 802.11, for example, or TCP, they require data to be</p> <p>9 sent in a certain format; is that correct?</p> <p>10 MR. KAPLAN: Object to form. 09:40:02</p> <p>11 THE WITNESS: Those protocols, the standards</p> <p>12 require, yes, data to be in a certain type. Just</p> <p>13 like all the other protocols.</p> <p>14 BY MR. PAK:</p> <p>15 Q Do the Wi-Fi and Ethernet standards require 09:40:17</p> <p>16 data to be sent in data packets?</p> <p>17 A The 802.11 Wi-Fi does. The Ethernet, as I</p> <p>18 said, you can -- Ethernet is basically the cable.</p> <p>19 Different protocols can run on it. TCP/IP is data</p> <p>20 packets, yes. Or it's based on data packets. 09:40:37</p> <p>21 Q Are there any Wi-Fi Ethernet standards that</p> <p>22 don't require data to be sent in the form of data</p> <p>23 packets?</p> <p>24 A As I said, I don't know the Wi-Fi inner</p> <p>25 workings of the proprietary ones, so I'm not sure I 09:40:58</p> <p style="text-align: right;">Page 32</p>
<p>1 THE WITNESS: Oh, I'm sorry. Did you say</p> <p>2 Ethernet or internet?</p> <p>3 BY MR. PAK:</p> <p>4 Q Wi-Fi or Ethernet.</p> <p>5 A Ethernet. I see. 09:37:29</p> <p>6 Q Yeah.</p> <p>7 A So the format for those is -- I mean, there's</p> <p>8 a Wi-Fi standard under the 802.11 IEEE, Institute of</p> <p>9 Electrical and Electronics Engineers, and that</p> <p>10 standard has been established for -- the devices 09:37:52</p> <p>11 that want to talk to each other on Wi-Fi have to</p> <p>12 implement that standard on the transmitter and the</p> <p>13 receiver so that they can communicate.</p> <p>14 There are also standards for Ethernet. A</p> <p>15 common one is TCP, Transfer Control Protocol. There 09:38:10</p> <p>16 are others.</p> <p>17 Q Can you name some of the other protocols?</p> <p>18 MR. KAPLAN: Object to form.</p> <p>19 THE WITNESS: There are Asynchronous Transfer</p> <p>20 Mode, ATM. Token Ring kind of networks. And a 09:38:43</p> <p>21 variation of that, which is a Star network.</p> <p>22 That's what comes to mind now. I'm sure I</p> <p>23 can think of more later.</p> <p>24 BY MR. PAK:</p> <p>25 Q Are there any other Wi-Fi standards other 09:39:18</p> <p style="text-align: right;">Page 31</p>	<p>1 can answer that. Or the wired ones.</p> <p>2 There are multi-room systems that have been</p> <p>3 around in the home installer market for a long time</p> <p>4 that use Ethernet. But it's not necessarily a</p> <p>5 standard Ethernet, based on a standard. So I 09:41:16</p> <p>6 couldn't say for sure what they use.</p> <p>7 Q Okay. And I want to introduce another</p> <p>8 exhibit here. Just give me one minute.</p> <p>9 A Sure.</p> <p>10 Q Okay. I just uploaded Exhibit 2. Let me 09:41:33</p> <p>11 know if you see it.</p> <p>12 A Yes. Okay.</p> <p>13 (Exhibit 2 was marked for identification</p> <p>14 electronically and is attached hereto.)</p> <p>15 BY MR. PAK: 09:41:57</p> <p>16 Q Do you recognize this document?</p> <p>17 A No.</p> <p>18 Q Okay. Well, I'll represent to you that these</p> <p>19 are slides from a computer networks course from</p> <p>20 Cornell University that I downloaded from the 09:42:11</p> <p>21 internet.</p> <p>22 Do you see on the first page it says "CS519:</p> <p>23 Computer Networks," correct?</p> <p>24 A I do.</p> <p>25 Q And it's a lecture from January 24, 2004, 09:42:18</p> <p style="text-align: right;">Page 33</p>

<p>1 right?</p> <p>2 A Yes.</p> <p>3 Q Okay. And I want to focus on the slide 6, so</p> <p>4 PDF page 6.</p> <p>5 A They're not numbered. What is the title of 09:42:35</p> <p>6 the slide?</p> <p>7 Q It says, "What is a data network?"</p> <p>8 A I see it.</p> <p>9 MR. KAPLAN: Chris, I don't mean to</p> <p>10 interrupt, but if you sort of scroll your mouse over 09:42:48</p> <p>11 the exhibit, it will show the page numbers there.</p> <p>12 THE WITNESS: Yeah, I just realized. But for</p> <p>13 some reason it's showing as page 5 for me. But,</p> <p>14 okay, I do see it.</p> <p>15 BY MR. PAK: 09:43:00</p> <p>16 Q I guess it is page 5. Page 5 of the PDF.</p> <p>17 A Yes.</p> <p>18 Q And it says:</p> <p>19 "What is a data network?" And</p> <p>20 then, "The answer is not a network 09:43:09</p> <p>21 that carries data."</p> <p>22 Do you see that?</p> <p>23 A I do.</p> <p>24 Q And the slide explains that one reason why a</p> <p>25 data network is not a network that carries data is 09:43:20</p> <p style="text-align: right;">Page 34</p>	<p>1 A First of all, I never heard that euphemism,</p> <p>2 and I'm pretty familiar with the field of streaming</p> <p>3 audio and networks and use for that, and voice. I</p> <p>4 think a voice network is a data network. It's</p> <p>5 carrying voice data. 09:44:59</p> <p>6 Q Well, what is a voice network?</p> <p>7 A It's a network that carries voice. For</p> <p>8 example, a telephony network.</p> <p>9 Q Could you give me some other examples of a</p> <p>10 voice network? 09:45:23</p> <p>11 A If we're talking about a network that only</p> <p>12 carries voice, then I think telephony is probably</p> <p>13 the only one that comes to mind. There are other</p> <p>14 networks that carry voice and other things, like</p> <p>15 cellular networks and cell phone networks. But if 09:45:42</p> <p>16 we're talking about just voice, then I would think</p> <p>17 telephony is the -- I -- I just thought of another</p> <p>18 one. A walkie-talkie network that has multiple</p> <p>19 wireless devices that a firefighter department would</p> <p>20 use, that is a voice network and it carries data. 09:46:01</p> <p>21 Q So a walkie-talkie network, in your opinion,</p> <p>22 is a data network?</p> <p>23 A Well, I guess walkie-talkie network is --</p> <p>24 walkie-talkie is the devices on a wireless network</p> <p>25 that exchange voice data. 09:46:25</p> <p style="text-align: right;">Page 36</p>
<p>1 because you can send data over a voice network,</p> <p>2 which is often a euphemism for a circuit network,</p> <p>3 and a voice network is not a data network.</p> <p>4 Do you see that?</p> <p>5 A I do. 09:43:36</p> <p>6 Q Do you agree with that statement?</p> <p>7 A Not at all.</p> <p>8 Q Why do you disagree?</p> <p>9 A I think it's an appropriate statement for a</p> <p>10 packet network course -- for a network course, it's 09:43:44</p> <p>11 appropriate for that kind of class, but I don't</p> <p>12 think that's a general statement that is true</p> <p>13 because data -- networks carry data. That's the</p> <p>14 very definition of a network.</p> <p>15 I don't know this class, but it sounds like 09:44:09</p> <p>16 they're going to be talking about a subset of</p> <p>17 networks that carry packet data, and they certainly</p> <p>18 exist.</p> <p>19 Q Well, you say you never taught a course in</p> <p>20 computer networks; is that right? 09:44:22</p> <p>21 A Yes.</p> <p>22 Q Do you agree that a voice network is a</p> <p>23 euphemism for a circuit network?</p> <p>24 A No. That is not a term of art.</p> <p>25 Q Why do you disagree? 09:44:32</p> <p style="text-align: right;">Page 35</p>	<p>1 Q And what protocol does this wireless network</p> <p>2 use to exchange voice data?</p> <p>3 A Most of them are based on radio frequency,</p> <p>4 RF. But the protocols, again, I think are</p> <p>5 proprietary to the individual companies that make 09:46:48</p> <p>6 them, like Motorola and others.</p> <p>7 Q And when you say a telephony network, are you</p> <p>8 referring to a public switch telephone network?</p> <p>9 A Yes.</p> <p>10 Q Okay. So a public switch telephone network 09:47:05</p> <p>11 is a voice network; is that right?</p> <p>12 A Yes.</p> <p>13 Q Is a cellular network a voice network?</p> <p>14 A Well, as I said before, it can be a voice</p> <p>15 network if all that anyone does on it is speak on 09:47:23</p> <p>16 the phone. But it is capable of other information</p> <p>17 as well on that network. So it's not exclusively</p> <p>18 voice.</p> <p>19 Q So a cellular network can either transmit</p> <p>20 voice or data, right? 09:47:36</p> <p>21 A No.</p> <p>22 MR. KAPLAN: Object to form.</p> <p>23 THE WITNESS: Voice -- a cellular network</p> <p>24 transmits or carries data. Voice is data as far as</p> <p>25 it's concerned. 09:47:53</p> <p style="text-align: right;">Page 37</p>

<p>1 BY MR. PAK:</p> <p>2 Q Right. So a cellular network can carry data</p> <p>3 in the form of voice, right, or non-voice data; is</p> <p>4 that right?</p> <p>5 A Right. 09:48:05</p> <p>6 Q So how do you transmit voice data over a</p> <p>7 cellular network?</p> <p>8 A Well, it depends on what kind of cellular</p> <p>9 network. There are different kinds of cellular</p> <p>10 networks. So the first ever created was probably, I 09:48:25</p> <p>11 would say, in Japan in 1979 or 1980, somewhere</p> <p>12 there. And it was an analog-based system where --</p> <p>13 and I guess at the time that would have been truly</p> <p>14 for voice because I don't think there was other</p> <p>15 multimedia data being sent over the network. 09:48:47</p> <p>16 So that was through a mechanism called</p> <p>17 frequency division multiplexing, which basically is</p> <p>18 a protocol for splitting up the audio bandwidth into</p> <p>19 different bands and then dividing them into</p> <p>20 different bands, and then blending them all together 09:49:04</p> <p>21 when they arrive at the other end. So that was a</p> <p>22 purely analog system. And, actually, it's still in</p> <p>23 existence in some parts of the world.</p> <p>24 There are also digital systems, and they have</p> <p>25 increased over the years from -- starting from 2G, 09:49:23</p> <p style="text-align: right;">Page 38</p>	<p>1 Sitting here today, you can't think of a</p> <p>2 digital cellular network that is not packet based,</p> <p>3 correct?</p> <p>4 A Correct, but that's not -- I'm not saying</p> <p>5 that they don't exist, just that I can't think of 09:51:15</p> <p>6 one.</p> <p>7 Q So you said in a cellular network, you can</p> <p>8 either transmit voice data or non-voice data, right?</p> <p>9 A Right.</p> <p>10 MR. KAPLAN: Object to form. 09:51:35</p> <p>11 BY MR. PAK:</p> <p>12 Q So in a cellular network, is -- is voice data</p> <p>13 transmitted differently than non-voice data? Do</p> <p>14 they take different paths?</p> <p>15 MR. KAPLAN: Object to form. 09:51:50</p> <p>16 THE WITNESS: Well, it kind of depends. If</p> <p>17 you're communicating with somebody else on another</p> <p>18 cellular phone, for example, the path between you</p> <p>19 and the other person may be different because of the</p> <p>20 way cellular networks work. If you're using your 09:52:09</p> <p>21 phone to send data to a device in your house, that</p> <p>22 would be a different path as well.</p> <p>23 So I guess I wasn't fully clear on your</p> <p>24 question.</p> <p>25 ////</p> <p style="text-align: right;">Page 40</p>
<p>1 which was the first one, all the way to what we have</p> <p>2 today, which is 5G, increasing the bandwidth of each</p> <p>3 connection and also total bandwidth to improve</p> <p>4 quality and speed.</p> <p>5 Q So in a digital cellular network, what -- 09:49:47</p> <p>6 when you transmit data, what -- what form does that</p> <p>7 data take? Is -- does it have to take the form of</p> <p>8 data packets?</p> <p>9 A The standards dictate the form. So there are</p> <p>10 different schemes. There's time division 09:50:16</p> <p>11 multiplexing, which was the next evolution after</p> <p>12 frequency division. I would say, yes, the majority</p> <p>13 of those are probably packet based.</p> <p>14 Q Are there any digital cellular networks that</p> <p>15 are not packet based? 09:50:32</p> <p>16 A I don't know. That would be a pretty</p> <p>17 sweeping statement for me to make without looking</p> <p>18 into it a little bit more.</p> <p>19 I can't think of an example off the top of my</p> <p>20 head, but I don't want to say no for sure because I 09:50:49</p> <p>21 would have to look into it.</p> <p>22 Q Sitting here today, you can't think of any</p> <p>23 digital cellular networks that are packet based --</p> <p>24 that are not packet based? Let me -- let me start</p> <p>25 over. 09:51:04</p> <p style="text-align: right;">Page 39</p>	<p>1 BY MR. PAK:</p> <p>2 Q I want to go back to the slide here. It</p> <p>3 says:</p> <p>4 "Data network is often a</p> <p>5 euphemism for packet network." 09:52:36</p> <p>6 Do you agree with that statement?</p> <p>7 A I do not.</p> <p>8 Q And you disagree with the statement because a</p> <p>9 data network is any type of network that carries</p> <p>10 data; is that -- is that correct? 09:52:52</p> <p>11 A That's correct. And the data can be in many</p> <p>12 different forms and it could be analog or digital.</p> <p>13 But even within those, it can be different protocols</p> <p>14 for each one of those.</p> <p>15 Q Is a voice network a packet network? 09:53:06</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 THE WITNESS: A voice network can be packet</p> <p>18 based, yes. But there are many -- the original</p> <p>19 PBX-type switches were not. Those were a voice</p> <p>20 network that was analog. And then later other 09:53:31</p> <p>21 networks came out that are digital.</p> <p>22 But analog voice networks still exist and are</p> <p>23 in use in many places, including elevators for</p> <p>24 safety and places where you want the internet not to</p> <p>25 fail, especially for safety applications. 09:53:47</p> <p style="text-align: right;">Page 41</p>

<p>1 BY MR. PAK:</p> <p>2 Q Okay. So an analog voice network is not a</p> <p>3 packet network, correct?</p> <p>4 A An analog -- no, it is not.</p> <p>5 Q Is a digital voice network a packet network? 09:54:01</p> <p>6 A As I said before, most of them are. There</p> <p>7 might be examples where they're not, but I don't</p> <p>8 know one off the top of my head. I would say most</p> <p>9 are.</p> <p>10 Q And I want to take a look at -- let me find 09:54:20</p> <p>11 the right slide here. I think it's PDF page 9 of</p> <p>12 the slides. The header says "Packet Network versus</p> <p>13 Circuit Network."</p> <p>14 Do you see that?</p> <p>15 A Yes. 09:54:44</p> <p>16 Q So this slide says:</p> <p>17 "Packet Network versus Circuit</p> <p>18 Network. By contrast, packet network</p> <p>19 allows small units of data packets to</p> <p>20 be individually sent to different 09:54:55</p> <p>21 destinations."</p> <p>22 Do you see that?</p> <p>23 A I do.</p> <p>24 Q Can you send data packets over a circuit</p> <p>25 network? 09:55:04</p> <p style="text-align: right;">Page 42</p>	<p>1 destinations."</p> <p>2 Yes, I would agree with that.</p> <p>3 BY MR. PAK:</p> <p>4 Q Can a circuit network be digital or analog?</p> <p>5 A Yes. 09:56:39</p> <p>6 Q What's an analog -- what are some examples of</p> <p>7 analog circuit networks?</p> <p>8 A Well, those are the original telephony</p> <p>9 products that connect to POTS, plain old telephone</p> <p>10 system lines. You still find limited -- you find 09:56:56</p> <p>11 them in network closets of many companies or other</p> <p>12 organizations. So, yes, there are analog switching</p> <p>13 or circuit networks that still exist.</p> <p>14 Q You said those are examples of an analog</p> <p>15 voice network, right? 09:57:31</p> <p>16 A Right.</p> <p>17 Q So is a voice network not a circuit network?</p> <p>18 A A voice network --</p> <p>19 Q Let me ask you a different question.</p> <p>20 Is a voice network synonymous -- synonymous 09:57:49</p> <p>21 with the term circuit network?</p> <p>22 A No.</p> <p>23 Q How are they different?</p> <p>24 A A circuit network is something that requires</p> <p>25 a physical connection to be made of the sending 09:58:02</p> <p style="text-align: right;">Page 44</p>
<p>1 A Probably not. I'm trying to figure out what</p> <p>2 the "by contrast" means here. Is there a previous</p> <p>3 slide that contrasts to something?</p> <p>4 Q Yeah. So in the context, you know, the</p> <p>5 header says, "Packet Network versus Circuit 09:55:32</p> <p>6 Network." So "by contrast" here it's comparing a</p> <p>7 packet network to a circuit network; is that</p> <p>8 correct?</p> <p>9 A Yes.</p> <p>10 Q So unlike a circuit network, this slide says: 09:55:42</p> <p>11 "A packet network allows small</p> <p>12 units of data packets to be</p> <p>13 individually sent to different</p> <p>14 destinations."</p> <p>15 Is that right? 09:55:59</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 THE WITNESS: Right. But -- so in a digital</p> <p>18 switching -- a digital circuit network, that could</p> <p>19 also be true, right?</p> <p>20 So I understand what they're trying to say 09:56:15</p> <p>21 here for the purposes of this class that they're</p> <p>22 teaching, but I guess reading the sentence by</p> <p>23 itself:</p> <p>24 "A packet network allows packets</p> <p>25 of data to be sent to different 09:56:30</p> <p style="text-align: right;">Page 43</p>	<p>1 location and the receiving location. You think of</p> <p>2 it as the old telephone operator plugging in patch</p> <p>3 cords. So that's a circuit network. What it</p> <p>4 carries is voice. And so I guess it's not a term</p> <p>5 that I often use, but it is a term that I guess 09:58:21</p> <p>6 people use calling it a voice network. You could</p> <p>7 send other things over an analog switching network.</p> <p>8 Q And you said earlier that public switch</p> <p>9 telephone network is a voice network, right?</p> <p>10 A I said -- I don't remember what I said. The 09:58:41</p> <p>11 public switch network can be used as -- for voice.</p> <p>12 Q Can a public switch telephone network be used</p> <p>13 in a circuit network?</p> <p>14 MR. KAPLAN: Object to form.</p> <p>15 THE WITNESS: It's not to be used in. It's 09:59:05</p> <p>16 implemented using circuit networks, or circuit</p> <p>17 network devices.</p> <p>18 BY MR. PAK:</p> <p>19 Q Well, let me ask you this way. Is a voice</p> <p>20 network a type of circuit network? 09:59:28</p> <p>21 A Yes.</p> <p>22 Q Okay. I want to introduce a new exhibit</p> <p>23 here, Exhibit 3. Just give me one minute.</p> <p>24 (Exhibit 3 was marked for identification</p> <p>25 electronically and is attached hereto.) 10:00:11</p> <p style="text-align: right;">Page 45</p>

<p>1 BY MR. PAK:</p> <p>2 Q Okay. I just uploaded Exhibit 3. Let me</p> <p>3 know when you see it.</p> <p>4 A I see it.</p> <p>5 Q Do you recognize this document? 10:00:23</p> <p>6 A I recognize maybe not this edition of it, but</p> <p>7 I have seen the computer dictionary before, yes.</p> <p>8 Q Okay. Yeah, so this is an excerpt from the</p> <p>9 Microsoft Computer Dictionary, Fifth Edition.</p> <p>10 And you said you're not sure if you read this 10:00:44</p> <p>11 edition, but you've looked through the Microsoft</p> <p>12 Computer Dictionary before, right?</p> <p>13 A Yes, I have.</p> <p>14 Q I want to look at page 3. At the bottom, do</p> <p>15 you see a definition for a data network? 10:01:04</p> <p>16 A Yes.</p> <p>17 Q Could you please read that definition for the</p> <p>18 record?</p> <p>19 A</p> <p>20 "A network designed for 10:01:15</p> <p>21 transferring data encoded as digital</p> <p>22 signals, as opposed to a voice</p> <p>23 network, which transmits analog</p> <p>24 signals."</p> <p>25 Q So like the Cornell University slide we just 10:01:25</p> <p>Page 46</p>	<p>1 A Correct.</p> <p>2 Q Why do you disagree?</p> <p>3 A Because I think we talked about several</p> <p>4 examples of networks that carry analog signals, and</p> <p>5 so it's not an opinion. I mean, the existence of 10:03:47</p> <p>6 those networks proves it doesn't have to be digital.</p> <p>7 Q And earlier, you know, as we discussed, your</p> <p>8 opinion is that a voice network can transmit analog</p> <p>9 signals, but it can also transmit digital signals;</p> <p>10 is that correct?</p> <p>11 A Yes.</p> <p>12 MR. KAPLAN: Object to form.</p> <p>13 THE WITNESS: Yeah, I agree with that.</p> <p>14 BY MR. PAK:</p> <p>15 Q Okay. Is local area network a term of art? 10:04:17</p> <p>16 A Yes, it is.</p> <p>17 Q Before Google engaged you as an expert for</p> <p>18 this matter, did you have an understanding of what</p> <p>19 local area network means?</p> <p>20 A Yes, I did. 10:04:31</p> <p>21 Q What was that understanding?</p> <p>22 A It is a -- again, infrastructure or medium</p> <p>23 for connecting multiple devices for the purpose of</p> <p>24 exchanging data.</p> <p>25 Q What are the types of devices that can be on 10:04:50</p> <p>Page 48</p>
<p>1 looked at, the Microsoft Dictionary distinguishes a</p> <p>2 data network from a voice network, correct?</p> <p>3 MR. KAPLAN: Object to form.</p> <p>4 THE WITNESS: That's what it says.</p> <p>5 BY MR. PAK: 10:01:48</p> <p>6 Q Do you agree with this definition of data</p> <p>7 network from the Microsoft Computer Dictionary?</p> <p>8 A I agree with parts of it. A network designed</p> <p>9 for transferring data. But I don't agree that it</p> <p>10 has to be digital. 10:02:00</p> <p>11 Q What does transferring data mean?</p> <p>12 A In this context, I think because it's</p> <p>13 Microsoft, it means -- I assume it means data from</p> <p>14 one computer is moved to another computer.</p> <p>15 Q So it talks about sending and receiving data, 10:02:31</p> <p>16 right?</p> <p>17 A I don't -- maybe transferring means -- to me</p> <p>18 means taking it from one place to another. I don't</p> <p>19 see anything in this definition that implies it's</p> <p>20 bidirectional. 10:02:53</p> <p>21 Q What do you mean by "bidirectional"?</p> <p>22 A Sending and receiving, as you said, between</p> <p>23 two devices, for example.</p> <p>24 Q Okay. So this definition, you disagree that</p> <p>25 a data network is limited to digital signals, right? 10:03:29</p> <p>Page 47</p>	<p>1 a local area network?</p> <p>2 A They can be -- because I work a lot with</p> <p>3 studios and other things, it can be mixing consoles,</p> <p>4 loudspeakers, computers, microphone preamplifiers,</p> <p>5 printers. There's a very large list of things it 10:05:16</p> <p>6 could be on this kind -- on a local area network.</p> <p>7 Q A local area network can be wired or</p> <p>8 wireless, correct?</p> <p>9 A Yes.</p> <p>10 Q What are the types of cables used to transfer 10:05:29</p> <p>11 data over a wired local area network?</p> <p>12 A It's similar to the list that we talked about</p> <p>13 before in terms of data networks. It's copper and</p> <p>14 all types of copper connections, including audio</p> <p>15 cables, speaker cables, Ethernet, coaxial cables, 10:05:53</p> <p>16 optical cables. That's probably a good list.</p> <p>17 Q So if a speaker is connected to the Sub</p> <p>18 Equalizer, for example, via a RCA cable -- let me</p> <p>19 start over.</p> <p>20 So if a speaker is connected to another 10:06:24</p> <p>21 device, such as the Sub Equalizer via RCA cables, is</p> <p>22 that on a local area network?</p> <p>23 A Yes. Those are exchanging data.</p> <p>24 Q Does a local area network require devices to</p> <p>25 transfer data in a certain format to communicate 10:06:51</p> <p>Page 49</p>

<p>1 with another device?</p> <p>2 A It does. The devices on that network have to</p> <p>3 all have an agreed-upon representation of the data</p> <p>4 or use an appropriate translator to make it</p> <p>5 understandable to them, but yes. 10:07:08</p> <p>6 Q So devices on a local area network have to</p> <p>7 communicate using a specific network protocol,</p> <p>8 right?</p> <p>9 A Yes.</p> <p>10 Q What are those network protocols? 10:07:25</p> <p>11 A So there are -- again, because I come from</p> <p>12 the audio world, there are modulation protocols,</p> <p>13 such as pulse code modulation, pulse width</p> <p>14 modulation, optical data protocols, which are</p> <p>15 digital. Well, all the ones I mentioned are 10:07:49</p> <p>16 digital.</p> <p>17 And then there are also the -- if we're</p> <p>18 talking about printers and computers, then there are</p> <p>19 the TCP internet protocols.</p> <p>20 Q Are these analog protocols or digital 10:08:04</p> <p>21 protocols?</p> <p>22 A Well, I guess I don't think of a protocol as</p> <p>23 analog or digital. It's -- there are protocols for</p> <p>24 analog data and there are protocols for digital</p> <p>25 data. Perhaps that's what you meant? 10:08:36</p> <p style="text-align: right;">Page 50</p>	<p>1 Q When you transmit digital data over a local</p> <p>2 area network, does that data have to take the form</p> <p>3 of digital data packets?</p> <p>4 A No, it doesn't have to.</p> <p>5 Q What other forms can that data take? 10:11:00</p> <p>6 A The examples I was giving before, some kind</p> <p>7 of a modulation. So pulse code or pulse width</p> <p>8 modulation. So, no, it doesn't have to be packet</p> <p>9 based.</p> <p>10 Q When we talked about modulations, you 10:11:30</p> <p>11 referred to them as analog data; is that right?</p> <p>12 A No. The one kind, frequency division, is the</p> <p>13 analog. But the -- so pulse code and pulse width,</p> <p>14 the examples I'm using here, require the translator</p> <p>15 device. 10:11:54</p> <p>16 So let's say you have an audio device that's</p> <p>17 sending out analog audio, but you want to connect it</p> <p>18 over a local network to other devices to receive</p> <p>19 that audio, the wired network. You might convert it</p> <p>20 to digital audio and then use -- and that conversion 10:12:16</p> <p>21 puts it in the forms of pulse code modulated or</p> <p>22 pulse width modulated audio. Most common is pulse</p> <p>23 code. It's sent over the network in that format and</p> <p>24 then the opposite operation happens at the receiving</p> <p>25 end. 10:12:37</p> <p style="text-align: right;">Page 52</p>
<p>1 Q Yeah, that's what I meant, actually.</p> <p>2 What are the protocols for analog data for a</p> <p>3 local area network?</p> <p>4 A So they're modulated -- so FM is -- not the</p> <p>5 radio kind of FM, but frequency or amplitude 10:09:02</p> <p>6 modulation of audio data can be sent over cables and</p> <p>7 demodulated at the receiving side and be converted</p> <p>8 back to audio. That's one that comes to mind for</p> <p>9 analog.</p> <p>10 Q Are there any other protocols for analog data 10:09:26</p> <p>11 over a local area network?</p> <p>12 A The method that I talked about before for the</p> <p>13 1G cellular networks, frequency division</p> <p>14 multiplexing, that can also be applied to wired</p> <p>15 local area networks as well. 10:09:50</p> <p>16 Q What are the protocols for digital data over</p> <p>17 a local area network?</p> <p>18 A It depends on the data. So if it's -- again,</p> <p>19 if we're talking about multimedia audio data, those</p> <p>20 can be the ones that I mentioned before, the pulse 10:10:12</p> <p>21 code or pulse modulation or optical, SPDIF.</p> <p>22 If we're talking about computers and</p> <p>23 printers, those are TCP-type protocols. But there</p> <p>24 are others. There are peer-to-peer connections that</p> <p>25 can happen. 10:10:36</p> <p style="text-align: right;">Page 51</p>	<p>1 So these converter devices are in many cases</p> <p>2 built into the audio source and receiver and</p> <p>3 sometimes they can be separate.</p> <p>4 Q So when you convert audio into digital form</p> <p>5 in pulse code modulator or pulse width modulated 10:12:55</p> <p>6 audio data, and you transmit that over a network,</p> <p>7 does that data have to take the form of data</p> <p>8 packets?</p> <p>9 A No.</p> <p>10 Q What does that data -- what form can that 10:13:19</p> <p>11 data take other than data packets?</p> <p>12 A You can think of it as a stream of zeroes and</p> <p>13 ones because it's digital now.</p> <p>14 I guess the best analogy I can think of is in</p> <p>15 Morse code you can have a long beep or a short beep, 10:13:39</p> <p>16 and so the pulses can be wide to represent, let's</p> <p>17 say, a one or short to represent a zero and then</p> <p>18 that pattern is read in by the receiving device and</p> <p>19 converts back to audio.</p> <p>20 Q Does an infrared remote that sends infrared 10:14:00</p> <p>21 signals to a TV amount to a coupling by way of a</p> <p>22 local area network?</p> <p>23 A Yes. It's sending data to a TV in this case,</p> <p>24 right? So over an agreed-upon protocol. So yes.</p> <p>25 Q So as long as data is being carried over to 10:14:36</p> <p style="text-align: right;">Page 53</p>

<p>1 another device using some agreed-upon protocol, 2 you're saying that that is enough to be on a local 3 area network; is that right? 4 MR. KAPLAN: Object. Form. 5 THE WITNESS: It's enough to be on a network. 10:14:55 6 Local area usually is used as a term of art to 7 differentiate it from larger networks. But, yes, I 8 agree. 9 BY MR. PAK: 10 Q What do you mean by a local area usually is 10:15:16 11 usually used as a term of art to differentiate it 12 from large networks? 13 A The industry uses these terms to give an idea 14 of the magnitude of the size of the overall network. 15 So they are, for example, wide area networks that 10:15:41 16 would consist possibly of multiple local area 17 networks and are generally considered to cover much 18 larger areas geographically. So it's kind of a 19 layered terminology. There are also metropolitan 20 area networks that typically are associated with a 10:16:03 21 city. 22 There's no hard definition of where the 23 boundary of one ends and another one begins, but one 24 would understand that a wide area network involves a 25 much larger geographic area than a local area 10:16:16 Page 54</p>	<p>1 Q Right. So there is a difference between a 2 data network and a local area network, right? 3 A No. A local area network is a data network. 4 But it has this additional attribute that is used to 5 compare it to larger data networks, which are called 10:18:13 6 wide area networks. 7 Q What is -- where are those additional 8 attributes that make a data network a local area 9 network? 10 A They are used in -- when making comparisons 10:18:27 11 between two networks to differentiate usually by the 12 number of devices or the geographical area that is 13 covered. 14 So they're all data networks, but the wide -- 15 it's generally understood that a wider network has 10:18:48 16 many more devices or covers a wider geographical 17 area than a local area network. 18 Q Are there any other additional attributes 19 that make a data network a local area network? 20 A Not that I can think of at the moment, no. 10:19:04 21 Q Do you know any examples of a wide area 22 network? 23 A Yes. I don't know if there's a name for it, 24 but the Western United States internet 25 infrastructure is generally considered a wide area 10:19:37 Page 56</p>
<p>1 network. 2 Q So local area network covers a limited area 3 compared to a wider network; is that right? 4 A I wouldn't say limited. It's just smaller 5 than the wide area network. All networks are 10:16:42 6 limited by area. Wide area networks are also 7 limited, perhaps to planet earth. But it's just a 8 terminology for relative size. So one would 9 understand a local area network has fewer devices on 10 it than a wide area network. 10:16:57 11 Q Let me ask you this way, then. A local area 12 network covers a limited geographical area; is that 13 right? 14 A As I said, a smaller geographic area. It can 15 be quite large. That's why I objected to "limited." 10:17:16 16 It can be pretty big. And then you say, okay, what 17 about wide? Wide area network would be bigger. 18 Q Correct, right. So local area network covers 19 a smaller geographical area than a wide area 20 network; is that right? 10:17:32 21 A Yes. 22 Q Is there a difference between a data network 23 and a local area network? 24 A Well, a local area network is a subset of the 25 data networks. 10:17:56 Page 55</p>	<p>1 network. Internet2 that we mentioned before is a 2 wide area network. 3 Q Do you know any other examples of wide area 4 networks? 5 A I would say satellite networks perhaps that 10:19:51 6 cover a part of the globe under their view are also 7 wide area networks. 8 Q How do you transmit data over a satellite 9 network? 10 A In multiple ways. It could be radio 10:20:22 11 frequency based modulation or it could be packet 12 based, like it is for cell phones or cell networks. 13 Q Can you transmit analog data over a satellite 14 network? 15 A Analog data -- I'm trying to think of -- for 10:20:41 16 example, a short-wave radio is a kind of a network 17 that uses analog data over large distances. It's 18 possible that it's rebroadcast through satellites. 19 I'm not sure. I think technically you can. 20 I can't think of an example at the moment, 10:21:13 21 but there's no reason that you couldn't. 22 Q Do you know any satellite networks that 23 transmit analog data? 24 A Not off the top of my head. I mean, I know 25 an old example -- communication with the Apollo 10:21:33 Page 57</p>

<p>1 astronauts was done through radio waves. Perhaps</p> <p>2 eventually that became digital. But, no, I can't</p> <p>3 think of an example off the top of my head.</p> <p>4 Q Does data that is transmitted over a</p> <p>5 satellite network have to take the form of data 10:21:55</p> <p>6 packets?</p> <p>7 A I don't think that's required, no.</p> <p>8 Q What other forms of data can be transmitted</p> <p>9 over a satellite network?</p> <p>10 A There are other modulation schemes that can 10:22:09</p> <p>11 be used. Radiofrequency modulation schemes can be</p> <p>12 used to transmit data over satellites.</p> <p>13 MR. PAK: How about we take a break, a quick</p> <p>14 break? Maybe come back in five minutes. Is that</p> <p>15 okay? 10:22:41</p> <p>16 THE WITNESS: Sure.</p> <p>17 THE VIDEOGRAPHER: We are off the record at</p> <p>18 10:22 a.m.</p> <p>19 (Recess.)</p> <p>20 THE VIDEOGRAPHER: We are on the record at 10:30:10</p> <p>21 10:30 a.m.</p> <p>22 BY MR. PAK:</p> <p>23 Q Dr. K., I want to explore a couple more</p> <p>24 examples regarding local area networks.</p> <p>25 A Okay. Before we get started, before you ask 10:30:25</p> <p style="text-align: right;">Page 58</p>	<p>1 causes that. But yes.</p> <p>2 Q Are there any other differences between a</p> <p>3 local area network and a personal area network?</p> <p>4 A Probably the number of devices in a local</p> <p>5 area network would be higher than the number of 10:32:24</p> <p>6 devices in a personal area network that are</p> <p>7 possible.</p> <p>8 Q Are there any other differences between local</p> <p>9 area network and a personal area network?</p> <p>10 A I can't think of one, no. 10:32:36</p> <p>11 Q So earlier you said, you know, communicating</p> <p>12 over two walkie-talkies could amount to a coupling</p> <p>13 by way of a data network, right?</p> <p>14 A Yes.</p> <p>15 Q And that's because you can carry data from 10:33:04</p> <p>16 one walkie-talkie to another walkie-talkie, correct?</p> <p>17 A Correct.</p> <p>18 Q What if I just had, you know, two cups on a</p> <p>19 string and I used that to communicate with George,</p> <p>20 who is right by me, is that on a data network? 10:33:25</p> <p>21 MR. KAPLAN: Object to form.</p> <p>22 THE WITNESS: That's a bit of an extreme</p> <p>23 example, but if your voice carried over the string</p> <p>24 and the string was carefully selected and there was</p> <p>25 no background noise, yeah, it's data. Your data is 10:33:46</p> <p style="text-align: right;">Page 60</p>
<p>1 your question, I -- as I was walking upstairs, I</p> <p>2 thought of an example, if I could amend my previous</p> <p>3 answer.</p> <p>4 An example of analog communication over</p> <p>5 satellites is of course the obvious one, broadcast 10:30:38</p> <p>6 television. Early days of broadcast television was</p> <p>7 analog signals being sent over satellite. That's an</p> <p>8 obvious one. Okay.</p> <p>9 Q Does a cell phone communicate with a</p> <p>10 Bluetooth headset amount to a coupling by way of 10:31:07</p> <p>11 local area network?</p> <p>12 A Yes.</p> <p>13 Q Wasn't Bluetooth a type of personal area</p> <p>14 network?</p> <p>15 A Again, these definitions are kind of 10:31:26</p> <p>16 arbitrary in the sense that there is no hard line of</p> <p>17 distance that goes from one to the other. It's a</p> <p>18 small local area network, but if I have a speaker 20</p> <p>19 feet away from me communicating by Bluetooth, then</p> <p>20 maybe that could be a local area network. It's not 10:31:46</p> <p>21 a hard definition.</p> <p>22 Q Does local area network cover a broader</p> <p>23 geographical area than a personal area network?</p> <p>24 A By consensus of people in the field thinking</p> <p>25 of it that way. It's not something technical that 10:32:07</p> <p style="text-align: right;">Page 59</p>	<p>1 getting across to somebody else to another device.</p> <p>2 Not a very sophisticated one, but yes.</p> <p>3 BY MR. PAK:</p> <p>4 Q So as long as two devices or two nodes carry</p> <p>5 data, that's going to be on a data network, in your 10:34:02</p> <p>6 opinion?</p> <p>7 A Yes.</p> <p>8 MR. PAK: Okay. I'm going to introduce</p> <p>9 Exhibit 4. I actually uploaded it on the break and</p> <p>10 marked it as Exhibit 4. Just let me know when you 10:34:27</p> <p>11 see it.</p> <p>12 THE WITNESS: I see it.</p> <p>13 (Exhibit 4 was marked for identification</p> <p>14 electronically and is attached hereto.)</p> <p>15 BY MR. PAK: 10:34:45</p> <p>16 Q Do you recognize this document?</p> <p>17 A Yes.</p> <p>18 Q This is your -- this is one of your</p> <p>19 publications; is that right?</p> <p>20 A That's right. 10:34:51</p> <p>21 Q And the title says, "RMI System: Internet</p> <p>22 Meets the Future Home Theater," right?</p> <p>23 A Correct.</p> <p>24 Q At a high level, what is this publication</p> <p>25 about? 10:35:07</p> <p style="text-align: right;">Page 61</p>

<p>1 A This describes a set of experiments that 2 actually relates to the Internet2 discussion that we 3 had earlier. RMI stands for Remote Media Immersion. 4 And for several years there was -- I was a faculty 5 investigator and then eventually a deputy director 10:35:30 6 of the National Science Foundation Engineering 7 Research Center that was established at USC, and 8 this was one of the kind of capstone experiments 9 that we did to push the limits of multimedia at the 10 time. This was in the late 1990s. 10:35:47 11 And so this paper talks about what 12 technologies would you -- would one need and how 13 would we use them to deliver what appears like high 14 quality representation of reality to somebody that 15 is far away. 10:36:06 16 Q What was your contribution with respect to 17 this paper? 18 A So several parts. It was the algorithms for 19 capturing audio on one end. Algorithms for 20 delivering it on the other end. Those were, I would 10:36:32 21 say, individual contributions. 22 And then there were collaborative 23 contributions in working with the researchers and 24 computer networks to develop methods together that 25 met the requirements of multichannel audio, 10:36:48 Page 62</p>	<p>1 concurrently." 2 Then the last sentence on that page says: 3 "Each cluster node is attached to 4 a local network switch with a fast or 5 Gigabit Ethernet link. The nodes 10:38:41 6 communicate with each other and send 7 the media data via these network 8 connections. We connected the local 9 switch to both a wide area network 10 backbone to serve distant clients and 10:38:51 11 a local area network, LAN, environment 12 with local clients." 13 Do you see that? 14 A I do. 15 Q So looking at Figure 1, what are the cluster 10:39:05 16 nodes? 17 A What are in terms of -- 18 Q What are the cluster nodes with respect to 19 Figure 1? Can you point to them or show me -- tell 20 me -- 10:39:28 21 A It's the ones that are labeled Node 0, 22 Node 1, Node 2, Node N. It was scalable. 23 Q What is a node? 24 A A node is I think a network -- people speak 25 for a connection of a device to the point of 10:39:53 Page 64</p>
<p>1 immersive audio, that were very different from the 2 requirements of sending faxes and e-mails in terms 3 of quality of service, forward error correction, and 4 other things like that. 5 Q Okay. And I want to look at PDF page 4, 10:37:12 6 Figure 1. 7 Do you see that? 8 A Yes. 9 Q Did you design this architecture shown in 10 Figure 1? 10:37:29 11 A This architecture is -- this is all 12 off-the-shelf equipment. It's computers and hard 13 disks and Ethernet switch and computers at the other 14 side. So this was not -- we discussed how to put 15 them together and all agreed that this is how we 10:37:58 16 would need to do it in order to achieve our goal. 17 But the individual pieces are off-the-shelf 18 components. 19 Q Okay. And, you know, I want to take a look 20 at the bottom of page -- PDF page 3 here, the last 10:38:12 21 paragraph. It says: 22 "Figure 1 (next page) shows the 23 server cluster architecture, which can 24 harness the resources of many nodes 25 and many disk drives per node 10:38:26 Page 63</p>	<p>1 connection between a device like a computer or 2 server to the network. 3 Q And a local switch described in your 4 publication is the Ethernet switch shown in 5 Figure 1; is that right? 10:40:10 6 A Right. 7 Q And the internet showing here in Figure 1 8 represents the wide area network backbone described 9 in your publication; is that right? 10 A Correct. 10:40:22 11 Q Does Figure 1 also depict a local area 12 network environment with local clients? 13 A Well, the personal computers shown there are 14 on a local area network. The ones where the nodes 15 were indicated. 10:40:45 16 Q So the nodes here represent personal 17 computers; is that right? 18 A I think node is a term which -- it's the 19 device -- nodes to me represent connections, the 20 connection points. They happen to be parts of a 10:41:11 21 computer, an interface that the computer has to 22 create that node. 23 So I wouldn't -- the computer itself is not 24 the node. I think the fact that it has a connection 25 at that point makes -- creates a node as kind of an 10:41:31 Page 65</p>

<p>1 entryway to that network.</p> <p>2 Q I want to take a look at the bottom</p> <p>3 paragraph, the left column of PDF page 4. The last</p> <p>4 sentence says:</p> <p>5 "VBR streams enhance the 10:41:54</p> <p>6 rendering quality, but they generate</p> <p>7 bursty traffic on a packet-switched</p> <p>8 network such as the Internet. In</p> <p>9 turn, this can easily lead to packet</p> <p>10 loss due to congestion." 10:42:04</p> <p>11 Do you see that?</p> <p>12 A Yes.</p> <p>13 Q Your publication here teaches that the</p> <p>14 Internet is a packet network, correct?</p> <p>15 A Yes. 10:42:14</p> <p>16 Q Looking at the last sentence of the next</p> <p>17 paragraph, it says:</p> <p>18 "To avoid traffic bottlenecks,</p> <p>19 each node transmits the data blocks</p> <p>20 that it holds directly to the clients 10:42:29</p> <p>21 via RTP. Hence, each client will</p> <p>22 receive RTP data packets from each</p> <p>23 server node within the cluster."</p> <p>24 Do you see that?</p> <p>25 A I do. 10:42:41</p> <p style="text-align: right;">Page 66</p>	<p>1 shown in Figure 1 transmit data packets over a wide</p> <p>2 area network; is that correct?</p> <p>3 A Well, they first go over a local area network</p> <p>4 into the switch, and then the switch multiplexes</p> <p>5 them all together and puts them onto the line that 10:44:55</p> <p>6 goes to the wide area network, as shown at the top</p> <p>7 through fast Ethernet or Gigabit Ethernet.</p> <p>8 Q Sure. So let me correct that here.</p> <p>9 So nodes communicate with the Ethernet switch</p> <p>10 over a local area network, correct? 10:45:09</p> <p>11 A Correct.</p> <p>12 Q And these nodes send data packets to the</p> <p>13 internet switch; is that correct?</p> <p>14 A Yes. In this architecture, yes.</p> <p>15 Q And in this architecture, the Ethernet switch 10:45:21</p> <p>16 connects to the -- or communicates over the internet</p> <p>17 and sends data packets over the internet; is that</p> <p>18 correct?</p> <p>19 A Right. Where it says "internet backbone</p> <p>20 routers," those are -- exist -- there's a connection 10:45:39</p> <p>21 in USC's IT building and that's -- so if we went</p> <p>22 from there to that router, then that router then has</p> <p>23 a direct line to the wide area internet. In this</p> <p>24 case, it was Internet2. Not the general internet,</p> <p>25 but a similar type of network. 10:45:58</p> <p style="text-align: right;">Page 68</p>
<p>1 Q What is RTP?</p> <p>2 A I think it's retransmission protocol. It's a</p> <p>3 type of protocol that enables error correction. In</p> <p>4 case there are lost packets, they are re-requested</p> <p>5 before they're stitched back together to avoid 10:43:00</p> <p>6 dropouts.</p> <p>7 This was one of the big things we had to</p> <p>8 worry about. You don't want audio dropouts. It</p> <p>9 does not make for a high-quality experience.</p> <p>10 Q Is RTP a type of internet protocol? 10:43:12</p> <p>11 A No. I would say UDP is an internet protocol,</p> <p>12 User Datagram Protocol, UDP is a type of internet</p> <p>13 protocol. And you can enable, if you will, or</p> <p>14 include in it a method like RTP that provides for</p> <p>15 the ability to correct errors that happen because of 10:43:43</p> <p>16 lost packets.</p> <p>17 Q Does UDP require data to be transmitted or</p> <p>18 received in the form of data packets?</p> <p>19 A Yes.</p> <p>20 Q So does RTP, right? 10:43:59</p> <p>21 A RTP is -- it's not a transmission -- it's not</p> <p>22 the same. Yes, RTP operates on packets to figure --</p> <p>23 and requests retransmission of ones that are missing</p> <p>24 based on what it was expecting, in simple terms.</p> <p>25 Q Okay. So looking at Figure 1, the nodes 10:44:26</p> <p style="text-align: right;">Page 67</p>	<p>1 Q Okay. I want to introduce Exhibit 5 here.</p> <p>2 Give me one second.</p> <p>3 Okay, I just uploaded Exhibit 5 and marked it</p> <p>4 as Exhibit 5. Let me know when you see it.</p> <p>5 A I see it. 10:46:21</p> <p>6 (Exhibit 5 was marked for identification</p> <p>7 electronically and is attached hereto.)</p> <p>8 BY MR. PAK:</p> <p>9 Q Do you recognize this document?</p> <p>10 A Yes. It's one of my patents. 10:46:33</p> <p>11 Q So you're a co-inventor of this patent,</p> <p>12 correct?</p> <p>13 A Yes.</p> <p>14 Q And the patent number is 8,705,764, right?</p> <p>15 A Yes. 10:46:47</p> <p>16 Q At a high level, what does this patent</p> <p>17 generally disclose?</p> <p>18 MR. KAPLAN: Object to form.</p> <p>19 THE WITNESS: We were trying to solve a</p> <p>20 problem that happens when you take audio -- you 10:47:05</p> <p>21 start with analog audio and then you digitize it</p> <p>22 into a high quality digital form. And then in order</p> <p>23 to store it perhaps on a portable device, one of</p> <p>24 many different data compression algorithms are used.</p> <p>25 MPEG being the most popular, but there are others 10:47:30</p> <p style="text-align: right;">Page 69</p>

<p>1 like AAC.</p> <p>2 The result of that compression is that the</p> <p>3 higher frequencies of sound that were in the</p> <p>4 original tend to be discarded in the name of</p> <p>5 bandwidth savings. And so this patent teaches a 10:47:44</p> <p>6 method to recreate the lost high frequencies using</p> <p>7 information that is in the lower frequencies that</p> <p>8 did not get discarded.</p> <p>9 BY MR. PAK:</p> <p>10 Q I want to focus on Column 11. It's on PDF 10:48:04</p> <p>11 page 21, lines -- lines 55 to 60. It's the last</p> <p>12 sentence before the last paragraph.</p> <p>13 Could you please read those lines for me for</p> <p>14 the record.</p> <p>15 A Is this the "Various embodiments" paragraph? 10:48:25</p> <p>16 Q The sentence right above it.</p> <p>17 A "The connectivity between the modules"? That</p> <p>18 one?</p> <p>19 Q Yes, that one.</p> <p>20 A Okay.</p> <p>21 "The connectivity between the</p> <p>22 modules and/or components within the</p> <p>23 modules may be provided using any one</p> <p>24 of the connectivity methods and media</p> <p>25 that is known in the art, including, 10:48:52</p> <p style="text-align: right;">Page 70</p>	<p>1 protocols.</p> <p>2 To be clear, the patent is really not about</p> <p>3 connecting -- it's just saying that the modules that</p> <p>4 we're discussing here that are going to do advanced</p> <p>5 audio processing don't necessarily have to be in one 10:51:30</p> <p>6 device, they can be spread out, distributed. That</p> <p>7 was the point of that paragraph.</p> <p>8 BY MR. PAK:</p> <p>9 Q What is the OSI protocol?</p> <p>10 A It's a -- the best way to describe it, it's 10:51:48</p> <p>11 an attempt at abstracting the individual layers that</p> <p>12 are required in a network system all the way from</p> <p>13 the hardware layer to the firmware to the software</p> <p>14 that needs to run on top of it, to the physical</p> <p>15 connections, in a way that provides a more uniform 10:52:16</p> <p>16 way for people that are trying to send data over</p> <p>17 these kinds of networks without having to know</p> <p>18 exactly what type of device was there.</p> <p>19 So it moves it up to be a more abstract</p> <p>20 representation of the interface of the network. I 10:52:34</p> <p>21 believe there are seven layers in it that -- in that</p> <p>22 stack.</p> <p>23 Q Does the data that is transmitted using the</p> <p>24 OSI protocol require data packets, data transmitted</p> <p>25 in the form of data packets? 10:53:01</p> <p style="text-align: right;">Page 72</p>
<p>1 but not limited to, communications</p> <p>2 over the internet, wired or wireless</p> <p>3 networks using the appropriate</p> <p>4 protocols."</p> <p>5 Q So it talks about communications over the 10:49:01</p> <p>6 internet using the appropriate protocols. What are</p> <p>7 the appropriate protocols communicated over the</p> <p>8 internet?</p> <p>9 A It's been a little while since I've seen</p> <p>10 this, so just give me a second to take a look and 10:49:18</p> <p>11 put it in context.</p> <p>12 Q Sure. Go ahead, take your time.</p> <p>13 A Yeah. Okay. It's all coming back.</p> <p>14 Q Okay. So let me re-ask the question here.</p> <p>15 What are the appropriate protocols to 10:50:17</p> <p>16 communicate over the internet?</p> <p>17 A It's what we talked about before. If it's</p> <p>18 the internet as we have it today, it's TCP/IP or</p> <p>19 peer-to-peer or UDP, as we just saw.</p> <p>20 Q Are there any other protocols? 10:50:39</p> <p>21 MR. KAPLAN: Object to form.</p> <p>22 THE WITNESS: There are others. There's --</p> <p>23 let's see. OSI is another one, Open System</p> <p>24 Interfaces. There are probably others I'm not</p> <p>25 remembering. There are a number of these internet 10:51:11</p> <p style="text-align: right;">Page 71</p>	<p>1 A Yes, it's a packet-based system.</p> <p>2 Q Okay. I want to look at Column 9, lines 20</p> <p>3 to 24 of your patent. And I'm just paraphrasing</p> <p>4 here, but it says that the output is characterized</p> <p>5 by a transfer function. 10:53:27</p> <p>6 Do you see that?</p> <p>7 A I do.</p> <p>8 Q What does the term "characterize" mean?</p> <p>9 A In this context it means that -- so we're</p> <p>10 talking about a system. A system has inputs and 10:53:43</p> <p>11 outputs. And typically when you do system analysis,</p> <p>12 you want to find a way to describe the output in</p> <p>13 terms of the input signal.</p> <p>14 And so the transfer function in this context</p> <p>15 says that if I have -- if I know what the amplitude 10:53:58</p> <p>16 level was to this box and I know what the transfer</p> <p>17 function is, then I can tell you what the output is.</p> <p>18 Q Do you know any words or phrases that are</p> <p>19 synonymous with the term "characterize"?</p> <p>20 MR. KAPLAN: Object to form. 10:54:17</p> <p>21 THE WITNESS: I'm trying to think of it in</p> <p>22 this context, and not just generally.</p> <p>23 What it really means here is mathematically</p> <p>24 described. Because we're talking about this</p> <p>25 equation here. That would be the closest I can 10:54:41</p> <p style="text-align: right;">Page 73</p>

<p>1 think of.</p> <p>2 BY MR. PAK:</p> <p>3 Q Can you think of any other words or phrases</p> <p>4 that are synonymous with "characterize"?</p> <p>5 A Not off the top of my head, no. 10:54:53</p> <p>6 Q But "describe" would be one of the terms that</p> <p>7 is synonymous with "characterize," right?</p> <p>8 MR. KAPLAN: Object to form.</p> <p>9 THE WITNESS: Yeah, but I don't want to -- in</p> <p>10 math we say mathematically described, so I would be 10:55:11</p> <p>11 more comfortable keeping it that way.</p> <p>12 BY MR. PAK:</p> <p>13 Q What about defined?</p> <p>14 MR. KAPLAN: Object to form.</p> <p>15 THE WITNESS: Defined has a different meaning 10:55:24</p> <p>16 to me. A definition in math or applied math means</p> <p>17 that you're making some assumptions and defining</p> <p>18 them. But that's not what is happening here.</p> <p>19 This is a -- an equation that has certain</p> <p>20 elements. And so the system is characterized by 10:55:47</p> <p>21 this transfer function. So I think describe</p> <p>22 mathematically is more accurate.</p> <p>23 BY MR. PAK:</p> <p>24 Q What if I say -- what if we change "the</p> <p>25 output is characterized by a transfer function" to 10:56:04</p> <p style="text-align: right;">Page 74</p>	<p>1 Q Okay. Let me try to introduce another</p> <p>2 exhibit here.</p> <p>3 I just uploaded a new exhibit and marked it</p> <p>4 as Exhibit 6. Let me know when you see it.</p> <p>5 A I see it. 10:58:25</p> <p>6 (Exhibit 6 was marked for identification</p> <p>7 electronically and is attached hereto.)</p> <p>8 BY MR. PAK:</p> <p>9 Q Do you recognize this document?</p> <p>10 A Yes, it is another one of my publications. 10:58:35</p> <p>11 Q The title of the publication is "High Quality</p> <p>12 Multichannel Audio Over the Internet," right?</p> <p>13 A Yes.</p> <p>14 Q What was your contribution to this</p> <p>15 publication? 10:58:51</p> <p>16 A These are two students in the center. One of</p> <p>17 them was in my group and the other one was in the</p> <p>18 networking group. And this was a paper that --</p> <p>19 similar to the previous one, it was trying to figure</p> <p>20 out ways to transmit high quality audio over the 10:59:09</p> <p>21 internet.</p> <p>22 And the reason that it was an interesting</p> <p>23 topic was that it was really not possible to</p> <p>24 transmit high quality audio over the internet, at</p> <p>25 least not in the early days. And so this paper 10:59:23</p> <p style="text-align: right;">Page 76</p>
<p>1 "the output is represented by a transfer function,"</p> <p>2 would that be accurate?</p> <p>3 MR. KAPLAN: Object to form.</p> <p>4 THE WITNESS: I don't think so because</p> <p>5 "represented" to me means it's not the thing, but 10:56:23</p> <p>6 it's being represented by something else. And</p> <p>7 that's not technically correct here. This H</p> <p>8 function is the function.</p> <p>9 BY MR. PAK:</p> <p>10 Q What if you say "the output indicates a 10:56:42</p> <p>11 transfer function," would that be incorrect?</p> <p>12 A No. That would be something completely</p> <p>13 different and it would indicate that there might be</p> <p>14 an output or something, but that's not -- this is a</p> <p>15 deterministic system, and so no. 10:57:00</p> <p>16 Q Well, looking at the equation here, the</p> <p>17 output Y equals the transfer function times the</p> <p>18 sinusoid input, S-I-N-U-S-O-I-D.</p> <p>19 So the output function here indicates the</p> <p>20 transfer function and the sinusoid input, right? 10:57:35</p> <p>21 A No.</p> <p>22 Q It provides some kind of indication of it?</p> <p>23 A No, no. This is a way to calculate the</p> <p>24 output function. So it is calculated by multiplying</p> <p>25 the transfer function with the complex sinusoid. 10:57:53</p> <p style="text-align: right;">Page 75</p>	<p>1 shows some ways of doing that.</p> <p>2 Q Let's take a look at the abstract. The</p> <p>3 second sentence here says:</p> <p>4 "We present a robust scalable</p> <p>5 architecture for delivering 10:59:44</p> <p>6 uncompressed multichannel audio over</p> <p>7 high bandwidth ATM networks."</p> <p>8 Do you see that?</p> <p>9 A I do.</p> <p>10 Q Is an ATM network a type of data network? 10:59:54</p> <p>11 A Yes.</p> <p>12 Q Is that because an ATM network carries data?</p> <p>13 A Actually, I should revise it.</p> <p>14 ATM network is a -- is a protocol for</p> <p>15 transmitting data over data networks. It stands for 11:00:10</p> <p>16 Asynchronous Transfer Mode, so it's a method of</p> <p>17 transmitting data over networks, over data networks.</p> <p>18 Q So an ATM network is not an actual network,</p> <p>19 it's a protocol; is that right?</p> <p>20 A Right. There's a -- there's a network 11:00:29</p> <p>21 architecture that has connectors and switches and</p> <p>22 things that have to support the ATM protocol in</p> <p>23 order to have an ATM network of devices.</p> <p>24 Q Okay. Looking at the abstract, it says:</p> <p>25 "Performance results from our 11:00:52</p> <p style="text-align: right;">Page 77</p>

<p>1 implementation on a high-speed local 2 area ATM network are presented that 3 identify the effects of audio packet 4 size, buffering, and network latency 5 on the quality of multichannel program 11:01:05 6 material." 7 Do you see that? 8 A I do. 9 Q So is a high-speed local area ATM network a 10 network protocol or a data network? 11:01:16 11 A No. This is -- this sentence is kind of 12 conflating to me. It's a local area network running 13 the ATM protocol for purposes of this experiment. 14 Q Got it. 15 A So it requires different hardware. A TCP 11:01:32 16 local area network would require a different 17 hardware than an ATM protocol local network. 18 Sometimes they can be in the same box, but usually 19 it's different. 20 Q So your publication here is talking about a 11:01:48 21 local area network that uses the ATM protocol; is 22 that correct? 23 A Right. 24 Q Did you design and implement the local area 25 network that uses this ATM network described in this 11:02:04 Page 78</p>	<p>1 screens, do this, change that, let's try this 2 exercise. And so it's hard to break it up into an 3 individual. 4 BY MR. PAK: 5 Q Yeah, understood. 11:04:04 6 So how about maybe -- let's take a look at 7 the last page, PDF page 6, and there's an 8 acknowledgment section. It says: 9 "The authors would like to thank 10 Dr. Sherali Zeadally" -- 11:04:18 11 I might be botching that name. 12 A No, that's all right. 13 Q So let me read it again. 14 "The authors would like to thank 15 Dr. Sherali Zeadally for his work in 11:04:30 16 its design and implementation of the 17 ATM network." 18 Do you see that? 19 A I do. 20 Q So Dr. Zeadally is the one who actually 11:04:39 21 designed and implemented the local area network that 22 uses the ATM network described in this publication, 23 correct? 24 A Well, so he was a collaborator on this. The 25 second author in the paper was a joint student, so 11:04:54 Page 80</p>
<p>1 publication? 2 A If you look in Figure 1 of the next page, 3 this is a similar simpler diagram than -- compared 4 to the one that we saw before with the RMI network. 5 So we designed this architecture or this set 11:02:28 6 of components that are all off-the-shelf audio 7 parts, and you can see the ATM adapter inside the 8 computer that allows you to put out onto the network 9 data that follows the ATM protocol. And then 10 there's the playback application on the top. 11:02:54 11 So, yeah, we designed this architecture, but 12 it consists of computers and switches and wires that 13 are off the shelf and software that we put inside it 14 to do what we -- to run this experiment. 15 Q And when you say that "we designed," are you 11:03:09 16 saying that you designed the network described in 17 Figure 1, for example? 18 MR. KAPLAN: Object to the form. 19 THE WITNESS: The way collaborative papers 20 work is this is a group, you know, we have group 11:03:31 21 meetings. We designed the experiment and then have 22 regular kind of intervals of meeting and discussing. 23 So if you're asking who designed each 24 individual part, it's hard to say because we had 25 joint code sessions where we all sat in front of the 11:03:53 Page 79</p>	<p>1 he was -- Mr. Zhu was Dr. Zeadally's student. 2 Dr. Zeadally's lab was doing experiments with ATM 3 networks, and they had the infrastructure that we 4 were looking for in terms of switches and the right 5 cables and so on. 11:05:17 6 So I think this is kind of -- because he 7 wasn't part of this particular experiment, he is not 8 a co-author, but we used his lab where he had kind 9 of a tabletop network for us to experiment with 10 these protocols. 11:05:34 11 Q Okay. I want to take a look at PDF page 3. 12 And there's a header 3 that says, "Experimental 13 Results". 14 A Yes. 15 Q Could you read the first two sentences under 11:05:51 16 that header? 17 A Yes. 18 "In order to assess the effects 19 of packet size and buffer size on the 20 quality of the audio streams 11:06:01 21 transmitted through the network, as 22 well as on the delay introduced by the 23 system, we performed a series of 24 tests." 25 The next one as well? 11:06:13 Page 81</p>

<p>1 Q You know, that's fine.</p> <p>2 A Okay.</p> <p>3 Q So this publication discloses a system</p> <p>4 architecture in which data packets are transmitted</p> <p>5 over a local area network that uses the ATM 11:06:25</p> <p>6 protocol; is that correct?</p> <p>7 A Well, this publication was not intended to</p> <p>8 disclose the architecture. It was more intended to</p> <p>9 use the architecture to experiment with what needs</p> <p>10 to be changed or fixed or, you know, what matters in 11:06:39</p> <p>11 high-quality audio transmission over a network that</p> <p>12 has the bandwidth and the architecture that could</p> <p>13 enable it. We just didn't know what the right</p> <p>14 architecture was for transmitting audio in terms of</p> <p>15 the buffer size and packet sizes, and so on. 11:06:56</p> <p>16 So it was more of an experimental paper that</p> <p>17 uses a network architecture based on the ATM system</p> <p>18 that was kind of local to us there so we could</p> <p>19 change things in it.</p> <p>20 Q All right. So the publication describes a 11:07:09</p> <p>21 local area network that uses the ATM protocol to</p> <p>22 transmit data packets, right?</p> <p>23 MR. KAPLAN: Object to form.</p> <p>24 THE WITNESS: The publication describes an</p> <p>25 experiment that was conducted on the system we just 11:07:24</p> <p style="text-align: right;">Page 82</p>	<p>1 Science Foundation.</p> <p>2 It's related to an experiment that we did</p> <p>3 with the New World Symphony based in Miami. And it</p> <p>4 was similar to the RMI experiment trying to --</p> <p>5 trying to deliver high-quality performance that is 11:09:57</p> <p>6 convincing you to feel like you're in the concert</p> <p>7 hall with them, even though you are 3,000 to 4,000</p> <p>8 miles away.</p> <p>9 We actually demonstrated this live to an</p> <p>10 audience of several hundred people. It was the 11:10:10</p> <p>11 first time that it had ever been done at that scale.</p> <p>12 BY MR. PAK:</p> <p>13 Q This publication talks about HYDRA. It's</p> <p>14 abbreviation for high resolution live streaming.</p> <p>15 What is HYDRA? 11:10:26</p> <p>16 A So HYDRA was -- Professor Zimmerman that you</p> <p>17 see there at the top, his laboratory and his</p> <p>18 research group was experimenting with using similar</p> <p>19 things that we talked about before using the UDP</p> <p>20 protocol with error correction to deliver 11:10:52</p> <p>21 high-quality content and overcome the problems that</p> <p>22 normally arise with traditional ways of doing that,</p> <p>23 for example, TCP, which were not designed for</p> <p>24 streaming media. They were designed for offline --</p> <p>25 it's okay if you can wait a second before you get 11:11:13</p> <p style="text-align: right;">Page 84</p>
<p>1 described.</p> <p>2 BY MR. PAK:</p> <p>3 Q Can you send data over a local area network</p> <p>4 using the ATM protocol in the form of data that is</p> <p>5 not a data packet? 11:07:51</p> <p>6 A No. The ATM protocol is a packet-based</p> <p>7 protocol.</p> <p>8 Q Okay. I want to introduce another exhibit</p> <p>9 here, so just give me a minute.</p> <p>10 Okay. I just introduced Exhibit 7. Let me 11:08:45</p> <p>11 know when you see it.</p> <p>12 A I see it.</p> <p>13 (Exhibit 7 was marked for identification</p> <p>14 electronically and is attached hereto.)</p> <p>15 BY MR. PAK: 11:08:51</p> <p>16 Q Do you recognize this document?</p> <p>17 A Yes.</p> <p>18 Q At a high level, what does this publication</p> <p>19 describe?</p> <p>20 MR. KAPLAN: Object to form. 11:08:58</p> <p>21 THE WITNESS: I don't know if this was an</p> <p>22 actual publication. This was more of an internal --</p> <p>23 more kind of like a white paper. I don't remember</p> <p>24 the origin of it. It could be part of a report that</p> <p>25 was presented to the annual review by the National 11:09:14</p> <p style="text-align: right;">Page 83</p>	<p>1 your e-mail, but you can't wait to get the next</p> <p>2 audio packet, right? So that's what HYDRA is. It</p> <p>3 was trying to do that.</p> <p>4 Q Okay. And I want to take a look at the</p> <p>5 second section, the Statement of Project Goals. And 11:11:27</p> <p>6 in the middle of that section, the publication says:</p> <p>7 "This project focuses on the</p> <p>8 design of a system that enables HD</p> <p>9 quality video and multiple channels of</p> <p>10 audio to be streamed across an 11:11:43</p> <p>11 IP-based network with commodity</p> <p>12 equipment."</p> <p>13 Do you see that?</p> <p>14 A Sorry. The middle section -- I missed where</p> <p>15 you pointed. 11:11:52</p> <p>16 Q Yeah. So in the middle of Section 2,</p> <p>17 Statement of Project Goals --</p> <p>18 A Oh, yes. I see it.</p> <p>19 Q Okay. What is an IP-based network as</p> <p>20 described in this publication? 11:12:06</p> <p>21 A It's an internet protocol based network,</p> <p>22 which is kind of a very common type of protocol for</p> <p>23 transmitting data over the internet.</p> <p>24 Q Okay. And the second page here, Section 4,</p> <p>25 the second to last paragraph -- second sentence -- 11:12:30</p> <p style="text-align: right;">Page 85</p>

<p>1 second to last sentence in the first paragraph, it 2 says: 3 "The transmission subsystem uses 4 the Realtime Transport Protocol, RTP, 5 on top of the Universal Datagram 11:12:45 6 Protocol, UDP." 7 Do you see that? 8 A Yes. 9 Q So this publication is talking about an 10 IP-based network that uses UDP; is that right? 11:12:55 11 A That's right. Those are subsets of an 12 IP-type network, just as TCP is. 13 Q I want to take a look at the system 14 architecture shown on Figure 1 of that page. 15 A Yes. 11:13:14 16 Q Do you see the stream transmitter/receiver in 17 the figure? 18 A Yes. 19 Q What does the stream transmitter/receiver do? 20 A That's -- that's a piece of software that's 11:13:25 21 kind of like the core of the HYDRA system. It takes 22 in multiple channels of microphones in this example 23 of a live recording, multiple cameras, and kind of 24 packages them together to send over the network by 25 paying attention to things that we talked about 11:14:03 Page 86</p>	<p>1 Q This is another one of your publications, 2 correct? 3 A Yes. 4 Q What does this publication describe? 5 MR. KAPLAN: Object to form. 11:15:51 6 THE WITNESS: This is another one of the same 7 kind of sequence of experiments we've been 8 discussing, which is high fidelity picture and sound 9 transmitted in a synchronized way over the Internet2 10 in this case. This particular one was trying to 11:16:08 11 understand what happens when you have an interactive 12 section. 13 So it's one way to stream in one direction to 14 an audience far away. It's another way when you 15 need to have two-way communication. Because in this 11:16:27 16 example, we had two musicians and they are supposed 17 to play a piano piece together, each on their own 18 piano. And musicians require, of course, very 19 accurate timing between them in order to perform. 20 So by adjusting -- artificially adjusting the 11:16:44 21 delay between the two of them is what -- how they 22 would hear the other side. And we were looking for 23 what the limits are of human performance over 24 networks. 25 ////</p>
<p>1 before, error correction and other things. 2 Q What is the form of data that is transmitted 3 or received over the IP-based network disclosed in 4 this system architecture? 5 A Well, it's what it says on the line above RTP 11:14:19 6 over UDP. 7 Q Right. So this system architecture is 8 designed to transmit or receive data packets, right? 9 A Well, it's using an existing network that is 10 based on data packets. 11:14:38 11 So we had to take the data that is coming in 12 in different forms, audio and video, and convert it 13 to match what the network expects, in this case, 14 data packets. 15 Q Okay. I want to introduce another exhibit 11:14:53 16 here. Just give me one minute. 17 Okay, I just uploaded a new exhibit and 18 marked it as Exhibit 8. 19 (Exhibit 8 was marked for identification 20 electronically and is attached hereto.) 11:15:27 21 BY MR. PAK: 22 Q Let me know when you see it. 23 A I see it. 24 Q Do you recognize this document? 25 A Yes. 11:15:39 Page 87</p>	<p>1 BY MR. PAK: 2 Q I want to take a look at the first paragraph 3 on the right column of page 1. After the first 4 sentence, it says: 5 "Network latency is an 6 unavoidable fact of interaction 7 environments over the Internet." 8 Do you see that? 9 A Yes. 10 Q What is network latency? 11:17:22 11 A It's the amount of time it takes for 12 information that was sent from one side of the 13 network and how long it takes to be received at the 14 other side. It is not instantaneous and it depends 15 on distance usually. That's what we call latency. 11:17:39 16 Q Why is network latency an unavoidable fact of 17 the interaction environments over the internet? 18 A Because of the protocols that are in place 19 that have been created to ensure, for example, that 20 data isn't lost. Sometimes that takes longer to 11:18:04 21 make sure that it's all collected before it's 22 presented to the other side. That's one reason. 23 The other reason is every time you go -- it's 24 not a direct connection between two distant places. 25 You go through switches on the network. And so 11:18:22 Page 89</p>

<p>1 switches also, as they pass the data through, 2 introduce delay in order again to avoid -- because 3 they're doing something to make sure not to lose 4 anything. So the connection of all these boxes 5 introduces some delay. 11:18:37 6 It's not that dissimilar from an analog 7 network over long distances. Audio doesn't travel 8 at the speed of light. The longer the cable is -- 9 it has to be pretty long, but you see delays in 10 analog circuits as well. 11:18:53 11 Q When you say "switches" on a network, are you 12 talking about packetized -- packet-based network 13 switches? 14 A In this case we're talking about the 15 internet, so that is a packet-based system, yes. 11:19:06 16 Q Okay. And the bottom of PDF page 1 under 17 subsection "Low Latency Audio," it says: 18 "The challenges in transmitting 19 audio over the internet are packet 20 loss and fluctuations in transmission 11:19:24 21 time." 22 So, you know, is packet loss, you know, 23 inevitable in a system that communicates over the 24 internet? 25 MR. KAPLAN: Object to form. 11:19:42 Page 90</p>	<p>1 In this case, because this was an Internet2 2 experiment, we had to convert it to the UDP style -- 3 the IP-type packet based form so that we could use 4 that network. 5 And then the opposite procedure happens at 11:21:23 6 the other end. We can't experience packets. We can 7 experience picture and sound. So we have to convert 8 it back. 9 Q So once data is converted from analog to 10 digital and sent over the internet, that data has to 11:21:35 11 take the form of packets; is that right? 12 A If we're going to use an internet -- existing 13 internet infrastructure, yes. 14 Q Okay. I want to take a look at Figure 1 15 shown on PDF page 2. 11:22:02 16 A Okay. 17 Q And the top of Figure 1 says: 18 "Data sources produce packetized 19 realtime data streams." 20 Do you see that? 11:22:16 21 A Yes. 22 Q What are the data sources in Figure 1? 23 A All kinds of multimedia capturing devices. 24 Camera, microphones -- cameras, microphones, in this 25 case haptic sensors. 11:22:38 Page 92</p>
<p>1 THE WITNESS: Inevitable? There are ways to 2 mitigate it, and trade-offs. So you could make it 3 not happen at all. If you were okay incurring more 4 latency, just wait longer for everything to arrive. 5 But that's the trade-off. So in a realtime system 11:19:59 6 where you don't have the luxury of waiting, they are 7 inevitable in that sense, yes. 8 BY MR. PAK: 9 Q Okay. But when we talk about devices that 10 communicate over the internet, we're talking about 11:20:20 11 devices that send or receive data in the form of 12 data packets, right? 13 A Well, in that diagram, the two end devices, 14 the one at Diagram 1 we were talking about, is 15 that -- I'm sorry. That was in the previous 11:20:38 16 example? Yes, it was. Let's see if it's here as 17 well. 18 The devices that connect to the internet, 19 let's say the computer that connects to the internet 20 on the sending side takes in analog data from the 11:20:53 21 real world, converts it first to digital, and then 22 it has to convert it to a form -- you know, if we're 23 doing this experiment over a different kind of 24 network, we'd have to convert to whatever that 25 network expected. 11:21:11 Page 91</p>	<p>1 Q So data from these data sources are 2 first converted to digital form, right, and then 3 sent in packets over the internet; is that correct? 4 MR. KAPLAN: Object to form. 5 THE WITNESS: Yes. Yes. That's what those 11:23:08 6 little rectangles are trying to indicate, that data 7 has been packetized in realtime using RTP, as it 8 says there. 9 BY MR. PAK: 10 Q Okay. You know, I'm going to start 11:23:26 11 transitioning over to discussing your declaration. 12 So why don't we take a ten-minute break. 13 Is that okay? 14 A Sure. 15 THE VIDEOGRAPHER: Off the record at 11:23:34 16 11:23 a.m. 17 (Recess.) 18 THE VIDEOGRAPHER: We are on the record at 19 11:36 a.m. 20 BY MR. PAK: 11:36:18 21 Q Dr. K., you submitted a declaration on 22 June 1, 2021, for this matter between Sonos and 23 Google, correct? 24 A Correct. 25 Q You were retained as an expert to offer 11:36:35 Page 93</p>

<p>1 opinions on claim construction related to the 2 asserted patents in this case, right? 3 A Yes. 4 Q When were you contacted to offer your 5 opinions for claim construction related to the 11:36:46 6 asserted patents? 7 MR. KAPLAN: Object to form. 8 THE WITNESS: Specific to claim construction, 9 the discussions probably started a month ago, I'm 10 guessing. 11:37:01 11 BY MR. PAK: 12 Q So you were -- were you first contacted to 13 offer opinions on claim construction in May; is that 14 correct? 15 MR. KAPLAN: Object to form. 11:37:13 16 THE WITNESS: Again, I don't have the dates 17 in my head. It was after I was retained for the 18 case, obviously, but sounds about right. It could 19 have been in April. 20 BY MR. PAK: 11:37:26 21 Q Okay. Were you informed of what each party's 22 construction was at the time? 23 A At the time -- I was eventually, but not at 24 the time, no. 25 Q What did you do to prepare for your 11:37:45 Page 94</p>	<p>1 observation purposes. 2 BY MR. PAK: 3 Q Did you consider any other material to 4 prepare your declaration? 5 A Other than what I mentioned, no. 11:39:51 6 Q All right. I'd like to introduce your 7 declaration here now as Exhibit 9. I marked it as 8 Exhibit 9 and uploaded it. So just let me know when 9 you see it. 10 A I see it. I just wanted to ask you a 11:40:36 11 question. I have a clean copy of the -- from the 28 12 pages of the part that I wrote on my desk. 13 Sometimes it's easier to go to a page that way than 14 it is -- if that's okay with you, I have it right 15 here. It's not marked. It's just a clean printout. 11:40:49 16 (Exhibit 9 was marked for identification 17 electronically and is attached hereto.) 18 BY MR. PAK: 19 Q Yeah, that's okay. 20 Can you look at the last page of your 11:40:53 21 declaration or PDF page 28 of Exhibit 9. 22 A Yes. 23 Q Is that your signature? 24 A It's my electronic signature, yes. 25 Q I forgot to ask you, is this a true and 11:41:17 Page 96</p>
<p>1 declaration? 2 A I read the patents. I read through the 3 patent office -- office actions. Some of the prior 4 art. That's basically it. And then used knowledge, 5 my experience in the field to help form my opinions. 11:38:12 6 Q Did you consider the cited references in 7 the -- did you consider the cited references in the 8 office actions? 9 A Oh, the office actions. 10 I'm trying to remember. I read through a lot 11:38:36 11 of documents. I don't know if that -- for sure. I 12 tried to be as complete as possible. I don't know 13 if I did or not. Probably. 14 Q Do you understand that Sonos's experts, 15 Dr. Almeroth and Dr. Schmidt, submitted declarations 11:38:59 16 on claim construction in this case? 17 A Yes. 18 Q Did you read Dr. Almeroth's declaration? 19 A I did. 20 Q Did you read Dr. Schmidt's declaration? 11:39:14 21 A I believe I did. 22 MR. PAK: And, you know, just for the record, 23 I just noted Dr. Schmidt is actually on this Zoom 24 call. So I just wanted to point that out. I think 25 he joined a little bit late, but he is just here for 11:39:37 Page 95</p>	<p>1 correct -- true and accurate copy of your 2 declaration submitted June 1, 2021? 3 A Yes, it is. 4 Q Okay. And the opinions set forth in this 5 declaration are yours, correct? 11:41:32 6 A Yes. 7 Q To date, this is the only declaration that 8 you submitted in this case, correct? 9 A That's right. 10 Q Your declaration is as accurate and complete 11:41:42 11 as you could reasonably make it, correct? 12 A Yes. There's a minor copy and paste problem 13 that happened that I saw last night, but other than 14 that, yes. 15 Q Okay. And where is that copy and paste 11:42:02 16 error? 17 A It's on page 13. Claim terms. Part A is 18 zone configuration and part B should be just group 19 configuration. But initially I had them both 20 together in one table and then I split it up. So B 11:42:26 21 should be just group. That's it. 22 Q Is that the only error you see in your 23 declaration? 24 A That's all I saw, yes. 25 Q So let's walk through your declaration. 11:42:42 Page 97</p>

<p>1 Section 2, paragraphs 8 through 13, sets 2 forth your qualification as an expert, correct? 3 A Yes. 4 Q And Section 3, paragraphs 14 to 22, sets 5 forth your understanding of various legal standards 11:43:00 6 related to claim construction; is that fair? 7 A That's correct. 8 Q In reaching your opinions set forth in your 9 declaration, did you apply the legal standards set 10 forth in Section 3? 11:43:16 11 A Yes. To the best of my ability, I did. 12 Q Okay. Section 4, paragraphs 23 to 29, sets 13 forth your overview of the asserted patents, 14 correct? 15 A Yes. 11:43:30 16 Q Subsection A -- in subsection A, you provide 17 an overview of what you call the direct play 18 patents, correct? 19 A Yes. 20 Q According to subsection A, the direct play 11:43:50 21 patents share a common specification, correct? 22 A Yes. 23 Q At subsection B you provide an overview of 24 what you call the zone scene patents, correct? 25 A Right. 11:44:14</p> <p style="text-align: right;">Page 98</p>	<p>1 this matter, correct? 2 A Right. 3 Q Section 7, paragraphs 37 all the way through 4 the end to paragraph 76, sets forth your analysis 5 regarding some of the parties' disputed claim 11:45:48 6 construction terms in this matter, correct? 7 A Yes. 8 Q And specifically paragraphs 37 to 48 provide 9 your analysis regarding the terms "zone 10 configuration" and "group configuration," correct? 11:46:02 11 A Correct. 12 Q Paragraphs 39 through 53 provide your 13 analysis regarding the term "local area network," 14 correct? 15 A 39? 11:46:18 16 Q Go ahead. Sorry. Let me repeat that. 17 Paragraphs 49 through 53 provide your 18 analysis regarding the term "local area network," 19 correct? 20 A Yes. 11:46:38 21 Q And paragraphs 54 to 59 provide your analysis 22 regarding the term of "media particular playback 23 system," correct? 24 A Yes. 25 Q Paragraph 60 to 73 provide your analysis 11:46:59</p> <p style="text-align: right;">Page 100</p>
<p>1 Q According to this section, the zone scene 2 patents include the '206, '966, and '855 patents, 3 correct? 4 A Yes. I just want to point out these names 5 were provided to me and I believe they were -- these 11:44:31 6 are the Sonos designations. I'm not a hundred 7 percent that's -- the groupings of the patents were 8 provided this way. 9 Q When I -- if I refer to certain patents as 10 direct play patents or zone scene patents, you 11:44:46 11 understand what I mean by those terms? 12 A Yes. 13 Q Okay. 14 A I do. 15 Q According to subsection B, the '206 patent 11:44:52 16 specification is substantially the same as the '966 17 and the '855 patent specifications, correct? 18 A Yes. 19 Q Okay. Moving on to section 5, paragraphs 30 20 to 34, those paragraphs set forth your opinions 11:45:14 21 regarding the level of ordinary skill in the art, 22 correct? 23 A Correct. 24 Q Then Section 6, paragraphs 35 and 36, sets 25 forth your understanding of the asserted claims in 11:45:28</p> <p style="text-align: right;">Page 99</p>	<p>1 regarding the term "data network," correct? 2 A Correct. 3 Q And, lastly, paragraphs 74 to 76 provide your 4 analysis regarding the term "wherein the instruction 5 comprises the instruction," correct? 11:47:18 6 A Right. 7 Q So we just walked through your declaration 8 here. Do you have any other changes besides that 9 copy and paste error that you would like to make to 10 your declaration? 11:47:33 11 A No. 12 Q So how about we jump to paragraph 24. It's 13 on page 9 of your declaration. 14 A Okay. 15 Q Okay. Paragraph 4 -- paragraph 24 says: 11:47:54 16 "Each of the zone scene patents 17 originated with U.S. provisional 18 application number 60/825,407, which 19 was filed on September 12, 2006." 20 Do you see that? 11:48:14 21 A Yes. 22 Q Now, let's take a look at paragraph 28 on the 23 next page. 24 A I see it. 25 Q Actually, if you go to the bottom of page 11, 11:48:33</p> <p style="text-align: right;">Page 101</p>

<p>1 it says:</p> <p>2 "In my experience, at the time</p> <p>3 the Zone Scene patents were filed,</p> <p>4 multi-zone audio systems existed from</p> <p>5 a variety of manufactures, such as 11:48:45</p> <p>6 Bose, Crestron, and others."</p> <p>7 Do you see that?</p> <p>8 A Yes.</p> <p>9 Q Do you know any specific conventional</p> <p>10 multi-zone audio systems that existed at the time 11:48:58</p> <p>11 the zone scene patents were filed?</p> <p>12 A Are you saying other than the ones I listed</p> <p>13 here?</p> <p>14 Q Well, you've listed manufacturers, right?</p> <p>15 But do you know any actual product names or model 11:49:11</p> <p>16 numbers?</p> <p>17 A Oh, product names. Let's see if I can recall</p> <p>18 any.</p> <p>19 The Bose one I think was called a Lifestyle.</p> <p>20 I'd have to look it up. 11:49:28</p> <p>21 Crestron -- Crestron makes hardware and</p> <p>22 software for multi-room installations, whether it's</p> <p>23 board rooms or homes. I don't know if they have a</p> <p>24 specific product name. But normally there's others.</p> <p>25 A lot of the home theater receiver manufacturers, 11:49:55</p> <p style="text-align: right;">Page 102</p>	<p>1 Q Could you please describe how the Bose</p> <p>2 Lifestyle system operates?</p> <p>3 A It has the main -- I guess I would call it a</p> <p>4 processing box where you connect your audio sources.</p> <p>5 So it acts as a source selector. That box provides 11:52:03</p> <p>6 outputs that go to amplifiers in it as well and</p> <p>7 provides outputs that interconnect the loudspeakers.</p> <p>8 In that case I believe it was a 5.1 surround system.</p> <p>9 And it has an additional -- I don't know what they</p> <p>10 call it -- breakout box that allows you to extend to 11:52:22</p> <p>11 a different room and still be controlled by the main</p> <p>12 controller. And also it had a remote control.</p> <p>13 Q How do the loudspeakers interconnecting to</p> <p>14 that central box communicate with the controller,</p> <p>15 the remote controller? 11:52:51</p> <p>16 A The remote controller sends signals over a</p> <p>17 wireless link to the main box, I guess main</p> <p>18 processor. And then it tells, you know, what each</p> <p>19 speaker should be playing over the wired</p> <p>20 connections. 11:53:18</p> <p>21 Q Do the loudspeakers connected to the central</p> <p>22 box communicate with one another?</p> <p>23 A With one another? No. The central processor</p> <p>24 decides what to send to each one.</p> <p>25 Q In the Bose Lifestyle system can you 11:53:40</p> <p style="text-align: right;">Page 104</p>
<p>1 such as Denon -- I know that one because that was</p> <p>2 the first product that Audyssey went into when we</p> <p>3 first started. It was the AVR5805, and many others</p> <p>4 after that. They all provide connectors and</p> <p>5 mechanism to have multiple zones of audio in your 11:50:19</p> <p>6 home.</p> <p>7 Initially there was two and eventually more</p> <p>8 than two, perhaps three or four. Yamaha, Marantz,</p> <p>9 Onkyo, many of those had those.</p> <p>10 Q Have you ever used a Bose Lifestyle system? 11:50:40</p> <p>11 A I have, yes.</p> <p>12 Q Do you know -- do you know which Bose</p> <p>13 Lifestyle system you used?</p> <p>14 A It's been so many years, so I don't remember</p> <p>15 the model number. 11:51:08</p> <p>16 Q Does the Bose Lifestyle 50, does that ring a</p> <p>17 bell?</p> <p>18 A Possibly, but I don't remember.</p> <p>19 Again, this was one of the situations where</p> <p>20 we brought it into the testing lab at Audyssey just 11:51:25</p> <p>21 to look at things. So paid less attention to the</p> <p>22 model number than what it could do.</p> <p>23 Q Do you recall how the Bose Lifestyle system</p> <p>24 operates?</p> <p>25 A At a high level, sure, yes. 11:51:41</p> <p style="text-align: right;">Page 103</p>	<p>1 synchronize the loudspeakers to play audio in</p> <p>2 synchrony?</p> <p>3 A Yes.</p> <p>4 Q How does the Bose Lifestyle accomplish that?</p> <p>5 A That's a Bose method inside their own 11:54:05</p> <p>6 processor. Let's just say it wouldn't be a very</p> <p>7 successful product if they played out of synchrony.</p> <p>8 It would be a terrible audio system.</p> <p>9 Q Right. But the loudspeakers don't</p> <p>10 communicate with each other, right? So how do they 11:54:25</p> <p>11 coordinate with one another to play audio in</p> <p>12 synchrony?</p> <p>13 A Because the central processor that is</p> <p>14 deciding what to send, what signal stream to send to</p> <p>15 each one makes sure that they are transmitted over 11:54:38</p> <p>16 each connection in the required synchrony.</p> <p>17 Q When you say "the central processor," you're</p> <p>18 talking about the central device that interconnects</p> <p>19 the loudspeakers, correct?</p> <p>20 A Right. That has a processor in it and it's 11:54:58</p> <p>21 responsible for a number of things, simple things</p> <p>22 like adjusting volume in response to commands that</p> <p>23 it receives. Perhaps decoding audio formats from</p> <p>24 the sources that are coming in. And then</p> <p>25 distributing the audio over the interconnect. 11:55:16</p> <p style="text-align: right;">Page 105</p>

<p>1 Q So the loudspeakers communicate with the</p> <p>2 central processor, right, but they don't communicate</p> <p>3 with one another directly, correct?</p> <p>4 MR. KAPLAN: Object to form.</p> <p>5 THE WITNESS: The loudspeakers receive data 11:55:35</p> <p>6 from the central processor, but they don't</p> <p>7 communicate with each other.</p> <p>8 BY MR. PAK:</p> <p>9 Q Okay. So what -- what cables are required to</p> <p>10 interconnect the loud speakers to the central box or 11:55:57</p> <p>11 the central processor of the Bose Lifestyle system?</p> <p>12 A These are provided by Bose. They are copper</p> <p>13 cables and they have RCA-type connections at the end</p> <p>14 of each side of the cable.</p> <p>15 Q Do you know if the Bose Lifestyle system can 11:56:31</p> <p>16 communicate over Wi-Fi?</p> <p>17 A I'm sure they have models that can. That</p> <p>18 particular one I don't think did.</p> <p>19 Q So the loudspeakers are internet connected to</p> <p>20 the central processor or central box, right? What 11:56:59</p> <p>21 is the form of data that is transmitted between the</p> <p>22 loud speaker and the central processor?</p> <p>23 MR. KAPLAN: Object to form.</p> <p>24 THE WITNESS: It's analog audio data.</p> <p>25 ////</p> <p style="text-align: right;">Page 106</p>	<p>1 communicate over a local area network?</p> <p>2 A Based on what I said this morning, that is a</p> <p>3 local area network. It's analog data going to --</p> <p>4 being carried over copper wires to end devices.</p> <p>5 Q Okay. And this Bose Lifestyle system was 11:59:06</p> <p>6 unable to -- incapable of communicating over the</p> <p>7 internet; is that right?</p> <p>8 MR. KAPLAN: Object to form.</p> <p>9 THE WITNESS: Because I don't remember the</p> <p>10 model, I'm not sure if this -- if you could stream 11:59:35</p> <p>11 to it. It could connect to a number of sources. I</p> <p>12 just don't recall if one of them could be a wireless</p> <p>13 source.</p> <p>14 BY MR. PAK:</p> <p>15 Q Do you know when you used this Bose Lifestyle 11:59:52</p> <p>16 system?</p> <p>17 A Probably seven or eight years ago.</p> <p>18 Q So sometime in 2013, 2012 you used this Bose</p> <p>19 Lifestyle system?</p> <p>20 MR. KAPLAN: Object to form. 12:00:13</p> <p>21 THE WITNESS: To the best of my recollection.</p> <p>22 BY MR. PAK:</p> <p>23 Q Do you know when this Bose Lifestyle system</p> <p>24 was released?</p> <p>25 MR. KAPLAN: Object to form. 12:00:23</p> <p style="text-align: right;">Page 108</p>
<p>1 BY MR. PAK:</p> <p>2 Q Does it have to be analog audio data?</p> <p>3 MR. KAPLAN: Object to form.</p> <p>4 THE WITNESS: In general or in that product?</p> <p>5 BY MR. PAK:</p> <p>6 Q In that product. In that product when a</p> <p>7 loudspeaker communicates to the central processor or</p> <p>8 the central box, does it send analog data or digital</p> <p>9 data?</p> <p>10 A It sends analog data because the amplifiers 11:57:42</p> <p>11 are inside that same box where the processor is. So</p> <p>12 the output of the amplifier is using analog audio</p> <p>13 signals sent to each speaker.</p> <p>14 Q So in that product, in that Bose Lifestyle</p> <p>15 system, the loudspeakers are not sending data 11:57:59</p> <p>16 packets to that central processor, correct?</p> <p>17 MR. KAPLAN: Object to form.</p> <p>18 BY MR. PAK:</p> <p>19 Q Sorry. Did you say "correct"?</p> <p>20 A Yes, correct. 11:58:17</p> <p>21 Q Okay. Do you know if the Bose Lifestyle</p> <p>22 system communicated over a local area network?</p> <p>23 A Communicated with what?</p> <p>24 Q Do you know if the loudspeakers</p> <p>25 interconnected to the central processor could 11:58:38</p> <p style="text-align: right;">Page 107</p>	<p>1 THE WITNESS: I know that their Lifestyle</p> <p>2 series was released well before that. I just -- and</p> <p>3 they have more than one model. So that was probably</p> <p>4 current at the time when we looked at it, but I</p> <p>5 don't know. 12:00:42</p> <p>6 BY MR. PAK:</p> <p>7 Q But this is the model of Bose Lifestyle</p> <p>8 system that included a remote control, you said; is</p> <p>9 that right?</p> <p>10 A Yes. 12:00:50</p> <p>11 Q Could you describe what this remote control</p> <p>12 did in the Bose Lifestyle system?</p> <p>13 A The obvious things. Selecting the source --</p> <p>14 again, this is a bit of a long time ago, but I think</p> <p>15 it was change the volume and select the room. I 12:01:14</p> <p>16 think they call it multi-room in the manual or in</p> <p>17 the Bose language. So select which room you want</p> <p>18 the music to play in or if it was all rooms.</p> <p>19 That's my basic recollection. There might</p> <p>20 have been other things too, but I just don't 12:01:42</p> <p>21 remember.</p> <p>22 Q Do you know what the Bose Lifestyle system</p> <p>23 remote control looked like? Like what shape it</p> <p>24 might have been in?</p> <p>25 MR. KAPLAN: Object to form. 12:02:01</p> <p style="text-align: right;">Page 109</p>

<p>1 THE WITNESS: It had a screen -- it had a 2 screen in front of it. It might have been 3 rectangular or oval. I'm stretching my memory. 4 BY MR. PAK: 5 Q I understand. I know it's 17 years ago. I 12:02:21 6 was just curious. 7 I want to move to paragraph 31 of your 8 declaration. It's talking about the level of 9 ordinary skill in the art. Could you please read 10 paragraph 31 of your declaration. 12:02:32 11 A Yes. 12 "In my opinion, a person of 13 ordinary skill in the art at this time 14 would have had a bachelor's of science 15 in electrical engineering, computer 12:02:42 16 science or engineering, or a related 17 field, and two to four years of work 18 or research experience in the field of 19 information networks, data 20 communications or multimedia systems, 12:02:52 21 or a master's degree and one to two 22 years of experience in the same 23 field." 24 Q Does that mean a person of ordinary skill in 25 the art can be someone with a master's degree in any 12:03:02 Page 110</p>	<p>1 today, but basically data networks. It's -- I guess 2 in -- at least at USC, I think the -- it's an area 3 that is studied called information networks. So I 4 think it's just different terminology for data 5 networks. 12:04:42 6 Q Are you using the term "information networks" 7 to be synonymous with "data networks"? 8 A In this paragraph, yes. 9 Q So an information network is any type of 10 media that carries data, right? 12:05:00 11 A Well, I don't know if it's -- like if you go 12 to a network engineer and ask them what an 13 information network is, that's the answer you would 14 get. This is more of an academic field that I was 15 referring to just because I know there are courses 12:05:17 16 listed that way. 17 So I don't know if it's a physical thing. I 18 was just referring to it as a field of study. 19 Q What does the field of data communications 20 include? 12:05:33 21 A Protocols for communication for exchanging 22 data. Error correction, anything to do with 23 handling of data, analog or digital. 24 Q What are multimedia systems? 25 A Multimedia systems are generally considered 12:06:01 Page 112</p>
<p>1 field and one to two years of experience in the 2 fields of information networks, data communications, 3 or multimedia systems? 4 A No. What I meant is a master's degree in the 5 areas that I listed for the bachelor's. 12:03:19 6 Q Okay. So what you -- what you meant was a 7 master's degree in electrical engineering, computer 8 science, or engineering, and one to two years of 9 experience in the fields of information networks, 10 data communications, or multimedia systems; is that 12:03:34 11 right? 12 A Correct. 13 Q Okay. So as it is written right now in 14 paragraph 31, the way it's written is incorrect, 15 right? 12:03:47 16 MR. KAPLAN: Object to form. 17 THE WITNESS: Well, I don't know if it's 18 incorrect. I mean, I didn't want to repeat. I know 19 that's probably customary in legal documents, but I 20 thought it was obvious that it was referring to for 12:04:02 21 bachelor's, you get your master's in the same 22 fields. 23 BY MR. PAK: 24 Q And what are information networks? 25 A We've talked about all kinds of examples 12:04:14 Page 111</p>	<p>1 processing systems with processing that can handle 2 multiple types of media, such as pictures, video, 3 audio, voice, text, haptics, all the ones that we 4 talked about earlier. 5 Q What about an audio system that only renders 12:06:38 6 audio, is that a multimedia system? 7 A An audio system that can't handle anything 8 else? 9 Q Yes. 10 A No. I would say no. Multi in multimedia 12:06:53 11 requires more than one. 12 Q So if a person has a -- sorry, I didn't mean 13 to cut you off. 14 A I'm fine. I'm done. 15 Q If a person has a bachelor's of science in 12:07:06 16 electrical engineering and only has experience in 17 audio systems that only render audio, but not any 18 other type of media, then that person would not 19 qualify as a person of ordinary skill in the art, 20 correct? 21 A No, I don't agree. I think if somebody has 22 studied multimedia systems as part of their field of 23 study, they have also studied audio and other 24 things. So if you have taken courses in multimedia 25 systems, you certainly have taken courses in just 12:07:49 Page 113</p>

<p>1 audio, similar to the ones that I teach, or just 2 speech like my colleagues teach, or just video, and 3 also the integration of them. So it comes with 4 everything.</p> <p>5 Q You know Sonos is a speaker company, right? 12:08:00 6 A Yes.</p> <p>7 MR. KAPLAN: Object to form.</p> <p>8 BY MR. PAK:</p> <p>9 Q So if a person who works at Sonos has a 10 bachelor's of science in electrical engineering and 12:08:14 11 has experience in working on speaker systems that 12 render audio but don't render video or any other 13 type of media, does that person still qualify as a 14 person of ordinary skill in the art?</p> <p>15 A That's kind of a hypothetical question. I'd 12:08:39 16 have to meet that person and find out what their 17 experience was to really answer that. I don't know 18 what courses they took or what experience they had 19 prior to Sonos.</p> <p>20 Q What I'm trying to get at here is the word 12:08:47 21 "multimedia systems." You know, it seems like in 22 order to have experience in multimedia systems, 23 right, you need to -- you need a person that studied 24 a systems that render multiple types of media, 25 according to your definition, right? 12:09:16</p> <p style="text-align: right;">Page 114</p>	<p>1 times. Computer games. More boring ones like 2 PowerPoint presentations with audio or video 3 embedded in them. Anything that has more than two 4 media. Or two or more, I should say.</p> <p>5 Q Is a multimedia system that can render two or 12:11:11 6 more types of media other than audio, would that 7 qualify as a multimedia system?</p> <p>8 A Sure.</p> <p>9 Q So if a person has experience in implementing 10 and designing multimedia systems that don't render 12:11:38 11 audio but other types of media, is it your opinion 12 that that person would qualify as a person of 13 ordinary skill in the art?</p> <p>14 A I'm sorry. Could you repeat that one more 15 time? 12:11:50</p> <p>16 Q Yeah. So if a person has experience in 17 implementing or designing a multimedia system that 18 doesn't render audio but renders other types of 19 media, is it your opinion that that person would 20 qualify as a person of ordinary skill in the art? 12:12:04</p> <p>21 A My assumption -- what I was trying to say 22 here was that this person has studied multimedia 23 systems. Whether they're designing now or not is 24 different. But if they studied multimedia systems, 25 then they certainly studied audio, voice, graphics 12:12:22</p> <p style="text-align: right;">Page 116</p>
<p>1 A Right. But not just renders. All aspects -- 2 multimedia systems represent systems that deal with 3 the integration, whether it's on the capture side, 4 compression, streaming of these integrated media 5 types. 12:09:47</p> <p>6 But in order to study that, you do have to 7 study each individual one as well. This is not 8 just -- all components have to be studied 9 individually as well. And I assume somebody with 10 that kind of degree -- just based on the degrees we 12:10:00 11 have at USC, I can say that that's for sure the 12 case.</p> <p>13 Q What are -- what are some examples of 14 multimedia?</p> <p>15 MR. KAPLAN: Object to form. 12:10:15</p> <p>16 BY MR. PAK:</p> <p>17 Q Or let me phrase it differently.</p> <p>18 What types of media -- what are some examples 19 of media types that would be categorized as 20 multimedia? 12:10:28</p> <p>21 A Okay. So we're talking about media, not 22 systems, right?</p> <p>23 Q Yes.</p> <p>24 A You know, some obvious ones are television 25 programs, picture and sound, and graphics many 12:10:39</p> <p style="text-align: right;">Page 115</p>	<p>1 and text and others, perhaps, depending on the 2 program. So they've certainly had experience.</p> <p>3 Q Okay. So you're assuming that if a person 4 has experience in multimedia systems, that person 5 would have experience in other types of media, 12:12:43 6 whether that's video, audio, or images, that person 7 would have experience in all of those different 8 types of media, correct?</p> <p>9 A Correct. I wouldn't call them "other." I 10 would call them components of multimedia. 12:12:56</p> <p>11 Q Okay. Let's take a look at paragraph 62 of 12 your declaration.</p> <p>13 A Yes.</p> <p>14 Q Would you please read that paragraph for me, 15 just the first two sentences. 12:13:28</p> <p>16 A</p> <p>17 "Numerous technical dictionaries 18 confirm that data," in quotations, 19 "including audio data, can be 20 represented in both analog," in 12:13:37 21 quotes, "or digital," in quotes, 22 "form. Digital data is," quotes, 23 "data represented in discreet 24 discontinuous form, as contrasted with 25 analog data represented in continuous 12:13:47</p> <p style="text-align: right;">Page 117</p>

<p>1 form," end quote.</p> <p>2 Q Okay. And then paragraph -- in paragraph 63,</p> <p>3 the second sentence, it says:</p> <p>4 "In the generic sense, packets</p> <p>5 refer to the manner in which data are 12:14:04</p> <p>6 organized into discreet units for</p> <p>7 transmission and switching through a</p> <p>8 data network."</p> <p>9 Do you see that?</p> <p>10 A Yes. 12:14:12</p> <p>11 Q So data packets are in digital form, correct?</p> <p>12 A Data packets are, yes.</p> <p>13 Q Can data packets be in analog form?</p> <p>14 A Data can be in analog form, but it's not</p> <p>15 transmitted using packets. 12:14:37</p> <p>16 Q Right. So data packets are not in analog</p> <p>17 form, correct?</p> <p>18 A Correct.</p> <p>19 Q Are there other discreet discontinuous forms</p> <p>20 of data that are not data packets? 12:14:53</p> <p>21 A Yes.</p> <p>22 Q What are those forms of data?</p> <p>23 A A digital audio stream that consists of bits,</p> <p>24 those are not packets. It's continuous stream of</p> <p>25 bits or a digital audio stream that we talked about 12:15:17</p> <p style="text-align: right;">Page 118</p>	<p>1 format and can be transported or</p> <p>2 streamed over a data network."</p> <p>3 Do you see that?</p> <p>4 A I do.</p> <p>5 Q The '206 patent discusses sending and 12:17:43</p> <p>6 receiving audio in digital form, correct?</p> <p>7 A Yes.</p> <p>8 MR. KAPLAN: Object to form.</p> <p>9 BY MR. PAK:</p> <p>10 Q Is there anywhere in the '206 patent that 12:17:52</p> <p>11 discusses sending and receiving audio data in the</p> <p>12 form of -- let me -- let me rephrase that.</p> <p>13 Is there anywhere in the '206 patent that</p> <p>14 discusses sending and receiving audio in analog</p> <p>15 form? 12:18:08</p> <p>16 A That wasn't -- I'd have to go look at it</p> <p>17 again. I don't remember every word of the patent.</p> <p>18 The sections that I looked at for my opinion were --</p> <p>19 you know, I just looked for those things. So I</p> <p>20 would have to go look and make sure of the answer. 12:18:26</p> <p>21 Q Sitting here today, you can't recall any</p> <p>22 passages in the '206 patent that discusses sending</p> <p>23 and receiving audio data in analog form, correct?</p> <p>24 MR. KAPLAN: Object to form.</p> <p>25 Mischaracterizes testimony. 12:18:43</p> <p style="text-align: right;">Page 120</p>
<p>1 before that has been modulated through some</p> <p>2 pre-agreed encoding scheme like pulse code</p> <p>3 modulation. Though those are not -- those are</p> <p>4 digital streams that are not packets.</p> <p>5 Q In order to stream audio from the internet, 12:15:44</p> <p>6 from an internet media source on a speaker, does</p> <p>7 that streaming audio have to be in the form of</p> <p>8 packets or can it be in a continuous form of data?</p> <p>9 A If we're talking about the general purpose</p> <p>10 internet, you know, it only supports packet 12:16:32</p> <p>11 protocols. So it would have to be put in that form.</p> <p>12 Q I'd like to introduce a new exhibit here. I</p> <p>13 uploaded it and marked it as Exhibit 10.</p> <p>14 (Exhibit 10 was marked for identification</p> <p>15 electronically and is attached hereto.) 12:16:55</p> <p>16 BY MR. PAK:</p> <p>17 Q Let me know when you see that.</p> <p>18 A I see it.</p> <p>19 Q Do you recognize this document?</p> <p>20 A Yes. It's the '206 patent. 12:17:06</p> <p>21 Q I want to take a look at Column 4. It's on</p> <p>22 PDF page 16 and line 36. It says:</p> <p>23 "As used herein, unless</p> <p>24 explicitly stated otherwise, an audio</p> <p>25 source or audio sources are in digital 12:17:32</p> <p style="text-align: right;">Page 119</p>	<p>1 THE WITNESS: Like I said, I don't want to</p> <p>2 say I do or I don't because I don't -- I'd have to</p> <p>3 go read it. It's possible.</p> <p>4 For example, I know that at Sonos there are</p> <p>5 Sonos audio products that have analog inputs on the 12:18:55</p> <p>6 back. And so I just don't know if -- I just don't</p> <p>7 know if there is a section in this patent since I</p> <p>8 haven't looked for that specifically.</p> <p>9 BY MR. PAK:</p> <p>10 Q Would it help if we take a few minutes for 12:19:17</p> <p>11 you to review the patent and see if you can find any</p> <p>12 passages that discuss sending and receiving audio in</p> <p>13 the form of analog data?</p> <p>14 A Sure.</p> <p>15 Q Okay. So how about we do that, take a few 12:19:29</p> <p>16 minutes.</p> <p>17 A Okay.</p> <p>18 THE REPORTER: Do you want to go off the</p> <p>19 record or not?</p> <p>20 MR. KAPLAN: No. 12:19:46</p> <p>21 THE WITNESS: By doing a quick search, I</p> <p>22 could find -- I could keep looking -- Column 4, line</p> <p>23 65:</p> <p>24 "The device 112 is configured to</p> <p>25 receive an analog audio source, e.g., 12:20:23</p> <p style="text-align: right;">Page 121</p>

<p>1 for broadcasting."</p> <p>2 The audio sources -- Column 5 -- I'm just</p> <p>3 reading from line 65 onward. The last line there</p> <p>4 says:</p> <p>5 "The analog audio sources can be 12:20:45</p> <p>6 converted to digital audio sources."</p> <p>7 BY MR. PAK:</p> <p>8 Q Right. And then the next sentence says:</p> <p>9 "In accordance with the present</p> <p>10 invention, the audio source may be 12:20:58</p> <p>11 shared among the devices on network</p> <p>12 108."</p> <p>13 Do you see that?</p> <p>14 A I do.</p> <p>15 Q So let's go back to paragraph 4 -- column 4, 12:21:07</p> <p>16 line 50. Could you please read that paragraph for</p> <p>17 me.</p> <p>18 A</p> <p>19 "The network 108 may be a wired</p> <p>20 network, a wireless network, or a 12:21:22</p> <p>21 combination of both."</p> <p>22 Q You can keep going.</p> <p>23 A</p> <p>24 "In one example, all devices,</p> <p>25 including the zone players 102, 104, 12:21:32</p> <p style="text-align: right;">Page 122</p>	<p>1 and 10. Without reading them directly, it talks</p> <p>2 about the ability to handle analog signals, whether</p> <p>3 it's processing them from inputs and then converting</p> <p>4 them to digital to share with other devices on a</p> <p>5 network. And then line 9 on the same column: 12:23:21</p> <p>6 "The audio amplifier is typically</p> <p>7 an analog circuit, but powers the</p> <p>8 provided analog audio signals to drive</p> <p>9 one or more speakers."</p> <p>10 Q So those sentences that you point out, you 12:23:43</p> <p>11 know, on Column 6 of the patent talk about</p> <p>12 processing analog signals, but when that signal is</p> <p>13 actually sent or received over the network, it talks</p> <p>14 about producing digital signals. So it's talking</p> <p>15 about converting the analog signals to digital 12:23:56</p> <p>16 signals to communicate over the network, correct?</p> <p>17 A Yes.</p> <p>18 MR. KAPLAN: Object to form.</p> <p>19 THE WITNESS: Yes. I was just responding to</p> <p>20 your question as to whether there is any mention of 12:24:06</p> <p>21 analog in this. Clearly the patent talks about</p> <p>22 products that could handle connections to analog</p> <p>23 input signals.</p> <p>24 BY MR. PAK:</p> <p>25 Q Right. But does this patent talk about 12:24:17</p> <p style="text-align: right;">Page 124</p>
<p>1 and 106, are coupled to the network by</p> <p>2 wireless means, based on an industry</p> <p>3 standard such as IEEE 802.11.</p> <p>4 "Another example --</p> <p>5 Q You can stop there. 12:21:47</p> <p>6 As the patent describes, network 108 is</p> <p>7 talking about an internet-based network that uses</p> <p>8 industry standards such as the IEEE 802.11 standard,</p> <p>9 correct?</p> <p>10 MR. KAPLAN: Objection. Mischaracterizes the 12:22:04</p> <p>11 document.</p> <p>12 THE WITNESS: I don't -- I wouldn't call this</p> <p>13 internet based. This just tells me how the</p> <p>14 components are communicating, which is a wireless --</p> <p>15 standard 802.11 wireless. 12:22:19</p> <p>16 BY MR. PAK:</p> <p>17 Q And the 802.11 standard requires data to be</p> <p>18 transmitted or received in digital format, correct?</p> <p>19 A Correct.</p> <p>20 Q And that data transmitted over 802.11 12:22:33</p> <p>21 standard requires data to be transmitted and</p> <p>22 received in the form of data packets, correct?</p> <p>23 A Correct.</p> <p>24 Referring back to your analog question, I'm</p> <p>25 just seeing more sections here. Column 6, line 3 12:22:59</p> <p style="text-align: right;">Page 123</p>	<p>1 sending analog data over the network, such as</p> <p>2 network 108 described in the patent?</p> <p>3 A I think it does indirectly. Because in line</p> <p>4 50 that you read before, the network may be a wired</p> <p>5 network. It doesn't say that that needs to be 12:24:47</p> <p>6 digital. It could be analog.</p> <p>7 Q Well, you know, let's go back to Column 4,</p> <p>8 line 36. It says:</p> <p>9 "As used herein, unless</p> <p>10 explicitly stated otherwise, when an 12:25:03</p> <p>11 audio source or audio sources are in</p> <p>12 digital format, they can be</p> <p>13 transported or streamed over a data</p> <p>14 network."</p> <p>15 Right? So in line -- line 50 when it says 12:25:14</p> <p>16 "The network 108 may be a wired network or a</p> <p>17 wireless network, or a combination of both," it's</p> <p>18 talking about sending data in digital format, right?</p> <p>19 Unless it's stated otherwise, you have to assume</p> <p>20 that you're sending or receiving data in digital 12:25:30</p> <p>21 format, correct?</p> <p>22 MR. KAPLAN: Objection. Mischaracterizes the</p> <p>23 document.</p> <p>24 THE WITNESS: I don't know. It's hard --</p> <p>25 it's like the paragraph here, maybe. I'm not 12:25:45</p> <p style="text-align: right;">Page 125</p>

<p>1 certain about that.</p> <p>2 BY MR. PAK:</p> <p>3 Q Sure. Let me ask you this way.</p> <p>4 So in line 50 in Column 4, it says:</p> <p>5 "The network 108 may be a wired 12:25:55</p> <p>6 network or a wireless network or a</p> <p>7 combination of both."</p> <p>8 Right?</p> <p>9 A Yes.</p> <p>10 Q Does that sentence mention analog? 12:26:02</p> <p>11 A No.</p> <p>12 Q Okay. Let's take a look at paragraph 64 of</p> <p>13 your declaration. So back to Exhibit 9. It's PDF</p> <p>14 page -- PDF page 23.</p> <p>15 And in the middle of that paragraph, it says: 12:26:43</p> <p>16 "These networks allowed cellular</p> <p>17 devices to send and receive data, as</p> <p>18 Sonos requires, typically in the form</p> <p>19 of voice calls."</p> <p>20 Do you see that? 12:26:56</p> <p>21 A Yes.</p> <p>22 MR. KAPLAN: I'm sorry. Which paragraph</p> <p>23 again?</p> <p>24 MR. PAK: Paragraph 64.</p> <p>25 MR. KAPLAN: Thank you. 12:27:08</p> <p style="text-align: right;">Page 126</p>	<p>1 switch telephone network and send audio data to</p> <p>2 render that audio data on one of those speakers?</p> <p>3 A Oh, yeah, absolutely. Speaker phones, right?</p> <p>4 Q Do the patents disclose speaker phones?</p> <p>5 A I was just giving you an example of what you 12:29:08</p> <p>6 could connect. You can connect any kind of</p> <p>7 transducer because what you're getting out is an</p> <p>8 audio signal. So if you send it to a loudspeaker,</p> <p>9 it will play, and the loudspeaker can be any kind of</p> <p>10 form. 12:29:29</p> <p>11 Q Does the '206 patent discuss sending or</p> <p>12 receiving data over a public switch telephone</p> <p>13 network?</p> <p>14 A Well, as I say, it talks about sending and</p> <p>15 receiving it over networks in general and it doesn't 12:29:42</p> <p>16 exclude that, but it doesn't mention it specifically</p> <p>17 either.</p> <p>18 Q Is a speaker phone capable of processing and</p> <p>19 rendering audio data?</p> <p>20 A Yes. 12:30:03</p> <p>21 Q Does the '206 patent discuss sending or</p> <p>22 receiving audio data via RCA cables?</p> <p>23 A The discussion we had before about connecting</p> <p>24 analog sources, and I do know that some of the Sonos</p> <p>25 speakers have that in the back, but that connection 12:30:30</p> <p style="text-align: right;">Page 128</p>
<p>1 THE WITNESS: I see it.</p> <p>2 BY MR. PAK:</p> <p>3 Q Does the '206 patent discuss sending or</p> <p>4 receiving audio data over a cellular or voice</p> <p>5 network? 12:27:19</p> <p>6 A Well, it discusses sending or receiving it</p> <p>7 over wireless networks. So that would cover all</p> <p>8 kinds of wireless networks in the broadest sense,</p> <p>9 right? It doesn't exclude them.</p> <p>10 Q Can you send data over a voice network to 12:27:41</p> <p>11 render audio on a device?</p> <p>12 A So because you don't have construction of</p> <p>13 what a voice network is, claim construction around</p> <p>14 voice network, I want to know what your definition</p> <p>15 is of voice network so I can answer correctly. 12:28:14</p> <p>16 Q Right. So earlier you said a voice network</p> <p>17 would be -- like an example would be a telephony</p> <p>18 network, like a public switch telephone network,</p> <p>19 correct?</p> <p>20 A Correct. 12:28:28</p> <p>21 Q And you wouldn't send or receive audio data</p> <p>22 over a public switch telephone network, would you?</p> <p>23 A Why not? Voice is audio data basically,</p> <p>24 right? So you kind of are doing that.</p> <p>25 Q Can you have speakers connected to a public 12:28:44</p> <p style="text-align: right;">Page 127</p>	<p>1 would typically be an RCA cable. It might also be a</p> <p>2 mini jack, a 1/8th inch jack or cable.</p> <p>3 Q Okay. So let's look at the patent, Column 1,</p> <p>4 line 40. Would you please read that first sentence</p> <p>5 for me. 12:31:15</p> <p>6 A</p> <p>7 "Currently one of the systems</p> <p>8 that can meet part of such demand is a</p> <p>9 conventional multizone audio system</p> <p>10 that usually includes a number of 12:31:21</p> <p>11 audio players."</p> <p>12 Q Keep going.</p> <p>13 A</p> <p>14 "Each of the audio players has</p> <p>15 its own amplifiers and a set of 12:31:28</p> <p>16 speakers and typically installed in</p> <p>17 one place, e.g., the room. In order</p> <p>18 to play an audio source at one</p> <p>19 location, the audio source must be</p> <p>20 provided locally or from a centralized 12:31:41</p> <p>21 location."</p> <p>22 Keep going?</p> <p>23 Q No, that's okay.</p> <p>24 Is there anything in this patent that</p> <p>25 distinguishes those type of conventional multi-audio 12:32:07</p> <p style="text-align: right;">Page 129</p>

<p>1 systems to what is disclosed in the patent as the 2 invention?</p> <p>3 MR. KAPLAN: Objection to form.</p> <p>4 BY MR. PAK:</p> <p>5 Q Let me put it this way. The next paragraph, 12:32:34 6 can you read the first sentence of that -- of line 7 56.</p> <p>8 A</p> <p>9 "In order to achieve playing 10 different audio sources in different 12:32:44 11 audio players, the traditional 12 multizone audio system is generally 13 either hard wired or controlled by a 14 preconfigured and preprogrammed 15 controller." 12:32:55</p> <p>16 Q Right. So the patent talks about traditional 17 multizone audio systems being either hardwired or 18 controlled by a preconfigured or preprogrammed 19 controller, and it distinguishes those traditional 20 multizone audio systems from the -- from the system 12:33:13 21 disclosed in the '206 patent as the invention, 22 right?</p> <p>23 MR. KAPLAN: Object to the form.</p> <p>24 THE WITNESS: I mean, that's kind of the 25 purpose of writing the background. What you're 12:33:49 Page 130</p>	<p>1 network interface functions by a wired 2 means, for example, an Ethernet 3 cable."</p> <p>4 Do you see that?</p> <p>5 A Yes. 12:35:46</p> <p>6 Q So the patent discloses that the wired 7 network can be an Ethernet cable, right?</p> <p>8 A That's a different network than the one that 9 connects -- this is not for connecting sources. 10 This is for connecting speakers together to -- could 12:36:07 11 be wired or wireless. The previous discussion was 12 about what kind of sources.</p> <p>13 Q Right. So this is talking about the wired 14 interface of a zone player, correct?</p> <p>15 MR. KAPLAN: Object to form. 12:36:36</p> <p>16 THE WITNESS: Yes. This is talking about how 17 to connect multiple zone players, in this case, 18 speakers, whether they're wired or wireless. They 19 provide capability for both.</p> <p>20 BY MR. PAK: 12:36:54</p> <p>21 Q So let's talk about the zone player. So the 22 zone player has network interface -- so a zone 23 player has a network interface 202, which may 24 include one or both of the wireless interface 216 25 and a wired interface 217, right? 12:37:17 Page 132</p>
<p>1 going to say after that is supposed to be better.</p> <p>2 BY MR. PAK:</p> <p>3 Q Right. So the disclosed system in the '206 4 patent that's described as the invention isn't 5 talking about these hardwired traditional multi-zone 12:34:07 6 audio systems, right?</p> <p>7 MR. KAPLAN: Objection to form.</p> <p>8 THE WITNESS: Well, it doesn't completely go 9 away from it because it allows for a wired source, 10 an analog wired source to be connected to one of the 12:34:31 11 zone players and then be distributed. So it doesn't 12 completely remove them.</p> <p>13 BY MR. PAK:</p> <p>14 Q Does the patent discuss what the wired source 15 has to be, what form it has to be in? 12:34:49</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 THE WITNESS: It gives examples at the bottom 18 of Column 4, line 66, broadcasting, which is analog, 19 compact disk, which could be digital or analog, 20 depending on what connection you have. Yeah, those 12:35:20 21 are examples.</p> <p>22 BY MR. PAK:</p> <p>23 Q All right. So let's take a look at Column 5. 24 And I'm looking at line 33. It says: 25 "The wired interface 217 provides 12:35:39 Page 131</p>	<p>1 A Yes.</p> <p>2 Q Okay. And specifically the wired interface 3 217 provides network interface function by wired 4 means, for example, an Ethernet cable, correct?</p> <p>5 A Correct. And this is why I was talking about 12:37:39 6 the introduction before. It seems to contradict the 7 benefit because they say that the old systems were 8 all wired and so they're no good. But now they also 9 provide capability for wired. So it's just a 10 different type of wire, I suppose. 12:37:55</p> <p>11 Q As you recall, did these traditional 12 multizone audio systems include speakers that were 13 connected via an Ethernet cable?</p> <p>14 A No. That's what I'm saying. They were 15 connected by copper RCA cables or speaker cables 12:38:16 16 directly.</p> <p>17 So this is a different kind of cable, but 18 still the possibility existed of speakers in 19 different zones or rooms that are connected by 20 wires. Just a different kind of wire. 12:38:31</p> <p>21 Q What is the difference between an Ethernet 22 cable and a copper wire such as an RCA cable?</p> <p>23 A I guess Ethernet cables are also made of 24 copper, but they have different kinds of endings and 25 they have multiple strands in them carrying data. 12:39:06 Page 133</p>

<p>1 So I guess I would consider an Ethernet cable 2 capable of carrying digital packet data, whereas an 3 audio interconnect carries analog audio data. 4 Q So an RCA cable carries analog data, whereas 5 an Ethernet cable carries digital data packets, 12:39:38 6 correct? 7 A To be totally clear, analog cables -- sorry, 8 RCA cables can also carry digital data. Just not 9 packetized. 10 Q Okay, that makes sense. 12:39:54 11 I want to take a look at paragraph 66 of your 12 declaration. 13 A Yes. 14 Q Let me get to it real quick. The second 15 sentence of paragraph 66 says: 12:40:21 16 "There are many types of networks 17 that do not require a network device 18 to both send and receive data from 19 another device. For example, networks 20 may be configured in a ring such that 12:40:31 21 no device both sends and receives data 22 directly to and from another device." 23 Do you see that? 24 A Yes. 25 Q Okay. So let's take a look at Sonos's 12:40:43 Page 134</p>	<p>1 directly to and from another device, correct? 2 MR. KAPLAN: Object to form. 3 THE WITNESS: I don't know how else to 4 interpret this. It says, "sending and receiving 5 from each other." So unless there is something in 12:42:10 6 between that is not disclosed, what else could it 7 be, right? 8 BY MR. PAK: 9 Q Right. So Sonos's construction of the data 10 network is broad enough to cover directly or 12:42:19 11 indirectly sending and receiving data, correct? 12 MR. KAPLAN: Object to form. 13 THE WITNESS: Right, that's true. But my 14 construction, though, was not really focused around 15 the directly part. It was that a data network, as 12:42:43 16 we've already discussed since this morning, doesn't 17 have to be digital packets. 18 BY MR. PAK: 19 Q Right. But let's look at paragraph 66 again. 20 And it says: 12:43:00 21 "For example, networks may be 22 configured in a ring such that no 23 device both sends and receives data 24 directly to and from another device." 25 Right? But Sonos's construction doesn't say 12:43:11 Page 136</p>
<p>1 proposed construction on page 21 of your 2 declaration. Could you please read Sonos's 3 construction for data network. 4 A 5 "A medium that interconnects the 12:41:00 6 devices enabling them to send data 7 packets to" -- 8 I'll start over. 9 "A medium that interconnects 10 devices, enabling them to send digital 12:41:09 11 data packets to and receive digital 12 data packets from each other." 13 Q Does Sonos's proposed construction of data 14 network require sending and receiving data directly 15 to and from another device? 12:41:26 16 MR. KAPLAN: Object to form. 17 THE WITNESS: I guess I'm not sure what 18 "directly" means in this context. We're connecting 19 two devices. 20 BY MR. PAK: 12:41:45 21 Q So let me ask you this way. Does the word 22 "directly" appear in Sonos's proposed construction? 23 A It does not. 24 Q Okay. So Sonos's construction of data 25 network does not require sending and receiving data 12:41:56 Page 135</p>	<p>1 or doesn't require direct -- directly sending and 2 receiving data, right? 3 MR. KAPLAN: Object to form. 4 THE WITNESS: The intent of this sentence 5 that I wrote here was that "directly" is kind of a 12:43:38 6 substitution for each other. Because obviously in a 7 network, in a ring network, devices are sending data 8 and they're receiving data. But it's not a send and 9 receive between two devices. And that's what I 10 meant by "directly" here. I didn't imply there was 12:43:54 11 nothing in between. 12 BY MR. PAK: 13 Q So -- sorry. 14 A No, no. 15 Q So in that -- so if a network is configured 12:44:03 16 in a ring, you'd agree with me that a device can 17 both send and receive data to and from each other? 18 A No. Because to and from each other means you 19 have two devices and they're talking back and forth. 20 And in a ring network, one device will send to the 12:44:27 21 next. If it has the token, it will -- let's say 22 it's clockwise orientation and it will send to the 23 next one and receive from the one before it. So 24 it's sending and receiving two different devices, 25 not a two-way communication. 12:44:50 Page 137</p>

<p>1 Q What is a token ring network?</p> <p>2 A It's a set of devices connected in a network</p> <p>3 that is -- as I described, think of a circle with</p> <p>4 multiple points in it. Each of those is a network</p> <p>5 device. The protocol is such that to avoid what 12:45:12</p> <p>6 network people call collisions, which is when a</p> <p>7 bunch of data tries to arrive at the same time, to</p> <p>8 avoid that they use traffic police kind of system</p> <p>9 where you can't talk unless you've been told to talk</p> <p>10 because you have the token. And so data goes around 12:45:36</p> <p>11 in circles. It can be clockwise. It can be</p> <p>12 counterclockwise. And sometimes it's a star</p> <p>13 configuration where there's a -- literally a central</p> <p>14 node and everybody communicates through, or</p> <p>15 sometimes it's a controller. So it's a different 12:45:51</p> <p>16 configuration for a network topology.</p> <p>17 Q I'd like to introduce a new exhibit here. I</p> <p>18 uploaded a new exhibit marked as Exhibit 11.</p> <p>19 Do you see that?</p> <p>20 A Yes. I'm waiting for it to open. I see it. 12:46:21</p> <p>21 (Exhibit 11 was marked for identification</p> <p>22 electronically and is attached hereto.)</p> <p>23 BY MR. PAK:</p> <p>24 Q Do you recognize this document?</p> <p>25 A Yes. 12:46:33</p> <p style="text-align: right;">Page 138</p>	<p>1 A Yes.</p> <p>2 Q Let's look at the top right PC. So this top</p> <p>3 right PC can receive data from one of these PCs,</p> <p>4 correct?</p> <p>5 A Assuming that the token protocols were 12:48:32</p> <p>6 followed, yes.</p> <p>7 Q From what devices can this PC receive data</p> <p>8 from?</p> <p>9 A From whichever device decided to address the</p> <p>10 token to that PC. 12:48:56</p> <p>11 Q So it can be any one of the four other</p> <p>12 devices on this token ring network, correct?</p> <p>13 A It can, although you'll have to -- if it's</p> <p>14 the one next to or below to the right, it would have</p> <p>15 to wait a while until it gets there because it has 12:49:19</p> <p>16 to go through all the other ones. But yes.</p> <p>17 Q So can that PC on the top right transmit data</p> <p>18 to any of the four other PCs in the token ring</p> <p>19 network?</p> <p>20 A Again, yes, if it decides it wants to 12:49:36</p> <p>21 transmit to one of them and puts that information on</p> <p>22 the token and addresses it to that PC, yes, it can</p> <p>23 do that.</p> <p>24 Q Okay. And I want to go back to your</p> <p>25 declaration now, looking at paragraph 67. On page 12:49:53</p> <p style="text-align: right;">Page 140</p>
<p>1 Q This was attached as Appendix L to</p> <p>2 Dr. Schmidt's declaration, and you reviewed this</p> <p>3 document, right?</p> <p>4 A I did, yes.</p> <p>5 Q I want to take a look at the last page, PDF 12:46:42</p> <p>6 page 6.</p> <p>7 Do you see the token ring network</p> <p>8 configuration at the bottom left?</p> <p>9 A I see it.</p> <p>10 Q So in this token ring network configuration, 12:46:56</p> <p>11 can a given device send data to or receive data from</p> <p>12 another device?</p> <p>13 A Yes, but not from the same device in both</p> <p>14 directions.</p> <p>15 Q Okay. And in the last sentence below that 12:47:17</p> <p>16 configuration, it says:</p> <p>17 "Any PC can grab a passing token</p> <p>18 and attach data and the address of</p> <p>19 another PC to it, as each PC in turn</p> <p>20 watches for tokens that are addressed 12:47:41</p> <p>21 to it."</p> <p>22 Right?</p> <p>23 A Yes.</p> <p>24 Q So you're saying in this configuration --</p> <p>25 let's pick one example. There's five PCs, right? 12:48:10</p> <p style="text-align: right;">Page 139</p>	<p>1 24.</p> <p>2 A Yes.</p> <p>3 Q It says:</p> <p>4 "Various publications also</p> <p>5 confirm that unidirectional data 12:50:08</p> <p>6 networks were well known in the art."</p> <p>7 And you relied on U.S. patent</p> <p>8 No. 6,081,907.</p> <p>9 Do you see that?</p> <p>10 A I do. 12:50:19</p> <p>11 Q And you would have to go to the electronic</p> <p>12 exhibit, because I want to look at PDF page 157.</p> <p>13 A Okay. That was Exhibit 9?</p> <p>14 Q Yes, correct.</p> <p>15 MR. KAPLAN: Which PDF page? 12:50:51</p> <p>16 MR. PAK: PDF page 157.</p> <p>17 THE WITNESS: I'm looking for an easier way</p> <p>18 besides scrolling.</p> <p>19 MR. KAPLAN: I don't know that there is.</p> <p>20 THE WITNESS: I'm almost there. Okay. 12:51:30</p> <p>21 Wait. I'm sorry. Are we talking about the</p> <p>22 monthly unique users graph?</p> <p>23 BY MR. PAK:</p> <p>24 Q No. Hold on one second. I'm putting it in</p> <p>25 the chat right here. 12:51:56</p> <p style="text-align: right;">Page 141</p>

<p>1 MR. KAPLAN: 157 for me is the '907 patent.</p> <p>2 THE WITNESS: Oh, I had 57. Okay.</p> <p>3 BY MR. PAK:</p> <p>4 Q There's a little scroll controls you can --</p> <p>5 A Yeah. 12:52:13</p> <p>6 Q Yeah.</p> <p>7 A Okay. I see it.</p> <p>8 Q Okay. And this is a copy of the '907 patent</p> <p>9 provided as an exhibit to your declaration, right?</p> <p>10 A Yes. 12:52:36</p> <p>11 Q Okay. And I want to go down to PDF page 165.</p> <p>12 And I want to focus on the background section of the</p> <p>13 '907 patent.</p> <p>14 A Okay.</p> <p>15 Q Okay. And the first paragraph of the 12:52:58</p> <p>16 background section says:</p> <p>17 "Conventional computer networks</p> <p>18 are bidirectional, allowing data</p> <p>19 communication in both directions</p> <p>20 between servers and clients. 12:53:08</p> <p>21 Transmitting data over these</p> <p>22 bidirectional data networks has been a</p> <p>23 mainstay of computer technology for</p> <p>24 many years and the communication</p> <p>25 protocols are well established." 12:53:20</p> <p style="text-align: right;">Page 142</p>	<p>1 BY MR. PAK:</p> <p>2 Q Okay. Let's take a look at Column 3, the</p> <p>3 second paragraph. It says:</p> <p>4 "The bidirectional data network</p> <p>5 28 represents various types of 12:54:33</p> <p>6 networks, including the internet, a</p> <p>7 LAN, local area network, a WAN, wide</p> <p>8 area network, and the like."</p> <p>9 Do you see that?</p> <p>10 A I do. 12:54:46</p> <p>11 Q In the next paragraph it says:</p> <p>12 "The broadcast center 26 receives</p> <p>13 the data served from the content</p> <p>14 servers 22(l) through 22(K) over the</p> <p>15 network 28, and broadcasts the data 12:55:02</p> <p>16 over a broadcast network 30 to the</p> <p>17 clients 24(l) through 24(M)."</p> <p>18 Do you see that?</p> <p>19 A I do.</p> <p>20 Q Now, if you look at Figure 1 of the '907 12:55:15</p> <p>21 patent, and it's PDF page 158, you see there's a</p> <p>22 separate bidirectional data network 28 and a</p> <p>23 broadcast network 30, right?</p> <p>24 A 28 and 30, yes, I see it.</p> <p>25 Q So you'd agree with me that the bidirectional 12:55:45</p> <p style="text-align: right;">Page 144</p>
<p>1 Do you see that?</p> <p>2 A Yes.</p> <p>3 Q All right. And the third paragraph in the</p> <p>4 background section, could you actually read that</p> <p>5 paragraph for me. 12:53:31</p> <p>6 A</p> <p>7 "Apart from the classic</p> <p>8 bidirectional data networks, there is</p> <p>9 an increasing interest in the use of</p> <p>10 broadcast or multicast networks to 12:53:40</p> <p>11 deliver computer data and other</p> <p>12 content to clients. These types of</p> <p>13 distribution networks are</p> <p>14 unidirectional in that data flows from</p> <p>15 the server to the clients, but no 12:53:50</p> <p>16 return communication is possible over</p> <p>17 the same communication path."</p> <p>18 More?</p> <p>19 Q That's okay.</p> <p>20 So the '907 patent actually distinguishes the 12:54:03</p> <p>21 classic bidirectional data network from a</p> <p>22 unidirectional broadcast or multicast network,</p> <p>23 correct?</p> <p>24 A Yes.</p> <p>25 MR. KAPLAN: Object to form. 12:54:17</p> <p style="text-align: right;">Page 143</p>	<p>1 data network 28 and broadcast network 30 in the '907</p> <p>2 patent are different networks, right?</p> <p>3 MR. KAPLAN: Object to form.</p> <p>4 THE WITNESS: That's what is shown in this</p> <p>5 diagram. They're showing an example that has both 12:56:11</p> <p>6 in there.</p> <p>7 BY MR. PAK:</p> <p>8 Q As shown in Figure 1, you'd agree that data</p> <p>9 network 28 is bidirectional, whereas the broadcast</p> <p>10 network 30 is unidirectional, correct? 12:56:24</p> <p>11 A Yes, that's what is being disclosed.</p> <p>12 Q Is there anywhere in the '907 patent that</p> <p>13 mentions that broadcast network 30 is a data</p> <p>14 network?</p> <p>15 MR. KAPLAN: Object to form. 12:56:43</p> <p>16 BY MR. PAK:</p> <p>17 Q And we can take a minute if you need a minute</p> <p>18 to review the patent.</p> <p>19 A Yeah, let me take a minute.</p> <p>20 So Column 3, line -- the paragraph that 12:57:30</p> <p>21 starts at line 33, it says:</p> <p>22 "The broadcast network 30 can be</p> <p>23 implemented in a variety of ways. For</p> <p>24 instance, the broadcast network might</p> <p>25 be implemented as a wireless network 12:57:55</p> <p style="text-align: right;">Page 145</p>

<p>1 configured for one-way transmission, 2 i.e., satellite, radio, microwave 3 et cetera. The broadcast network 4 might also be a network that supports 5 two-way communication, but is 12:58:08 6 predominantly used for unidirectional 7 multicasting from the broadcast center 8 26 to many clients simultaneously." 9 Q So in that sentence, does the patent use the 10 word "data network"? 12:58:29 11 A Well, as we've said before several times, 12 wireless networks that transmit data are data 13 networks. And so it doesn't say data network when 14 it talks about ATM or Ethernet or anything else. 15 These are all data networks. 12:58:54 16 Q Why does the patent use the term "data 17 network" when it describes data network 28, but 18 doesn't use the term "data network" when it talks 19 about broadcast network 30? 20 MR. KAPLAN: Object to form. 12:59:09 21 THE WITNESS: I don't know what they had in 22 mind in their language to write it that way, but -- 23 I don't know. I can't answer why they said it that 24 way. 25 ////</p> <p style="text-align: right;">Page 146</p>	<p>1 Q Sure. Take a minute if you need a minute to 2 review. 3 A I think it goes back to Column 3, the 4 paragraph that I was reading before, line 33 -- 5 actually, line 36 where it gives examples. 01:00:59 6 Satellite, radio, and microwave. What we talked 7 about before, satellite may or may not be data. But 8 radio and microwave is -- may not be data packet, 9 but radio and microwave are most likely not packet 10 based. So it's certainly possible the way they 01:01:25 11 wrote it. 12 BY MR. PAK: 13 Q Let's take a look at the figures here. And I 14 want to take a look at Figure 4. Let me see if I 15 can find the description for it. 01:01:58 16 Actually, let's take a look at Column 5, line 17 35. The paragraph says: 18 "Figure 4 shows exemplary steps 19 in a method for serving data packets 20 over the unidirectional network." 01:02:21 21 Do you see that? 22 A Yes. 23 Q So Figure 4 is describing a method specific 24 to transmitting data packets over broadcast network 25 30, right? 01:02:35</p> <p style="text-align: right;">Page 148</p>
<p>1 BY MR. PAK: 2 Q Let's look at Column 4 of the '907 patent. 3 If you look at line 22 -- 4 A Yes. 5 Q It says: 12:59:45 6 "The packet encoder 52 7 encapsulates packets of data with 8 appropriate headers for transmission 9 over the data network and broadcast 10 network." 12:59:57 11 Do you see that? 12 A Yes. 13 Q So this patent discloses that the 14 bidirectional data network 28 and the broadcast 15 network 30 both transmit data in the form of data 01:00:12 16 packets, right? 17 A I can indirectly assume that based on this 18 sentence. 19 Q Do you see any disclosure in the '907 patent 20 where data that is transmitted over the data network 01:00:33 21 or the broadcast network is not in the form of data 22 packets? 23 MR. KAPLAN: If you need to review the 24 patent, you can. 25 BY MR. PAK:</p> <p style="text-align: right;">Page 147</p>	<p>1 MR. KAPLAN: Object to form. 2 THE WITNESS: It's describing a method, but 3 not all the methods, right? Because we talked about 4 other possibilities. In this paragraph it's a 5 method, yes. 01:02:47 6 BY MR. PAK: 7 Q And then Column 6, line 15, it says: 8 "Figure 5 shows the byte-wise 9 technique for generating a redundancy 10 packet from multiple data packets 01:03:25 11 within a redundancy group." 12 Do you see that? 13 A I'm sorry. I heard it, but I missed which 14 paragraph we're in. 15 Q Column 6, line 15. 01:03:37 16 A Yes, I see it. 17 Q So Column 5 again is describing a certain 18 technique for generating packets, right? Data 19 packets? 20 MR. KAPLAN: Object to form. 01:03:54 21 Do you mean Figure 5? 22 BY MR. PAK: 23 Q Yeah, I'm sorry. Let me rephrase. 24 Figure 5 is illustrating a specific technique 25 for generating data in the form of data packets, 01:04:09</p> <p style="text-align: right;">Page 149</p>

<p>1 right?</p> <p>2 A In this paragraph it's talking about a</p> <p>3 specific aspect of it, aspect of the redundancy</p> <p>4 formatter, I think is what they're talking about</p> <p>5 here. 01:04:35</p> <p>6 Q Right. But, generally speaking, Figure 5 is</p> <p>7 talking about data packets, correct? It's talking</p> <p>8 about data in the form of data packets.</p> <p>9 MR. KAPLAN: Object to form.</p> <p>10 THE WITNESS: It is. I'm just looking a 01:04:50</p> <p>11 little further down where it says it's illustrative</p> <p>12 for example purposes. "Other computations may be</p> <p>13 used" -- this is line 30 of the same column.</p> <p>14 So there are examples that involve packets, I</p> <p>15 agree with that. But they're also saying there are 01:05:20</p> <p>16 other ways.</p> <p>17 BY MR. PAK:</p> <p>18 Q Okay. And then Column 7, second paragraph,</p> <p>19 it says:</p> <p>20 "Figure 6 shows an exemplary data 01:05:31</p> <p>21 structure 110 for data packet formed</p> <p>22 by packet encoder 52 and redundancy</p> <p>23 formatter 54."</p> <p>24 Do you see that?</p> <p>25 A I see it. 01:05:42</p> <p style="text-align: right;">Page 150</p>	<p>1 possible coexistence.</p> <p>2 So, no, I don't see any figure -- the figures</p> <p>3 are focusing on byte patterns and headers and packet</p> <p>4 related stuff. But, again, this was not my purpose</p> <p>5 for quoting this patent. 01:07:24</p> <p>6 MR. PAK: Okay. I want to transition away</p> <p>7 from discussing data networks and talk about some of</p> <p>8 the other terms in your declaration. Do you want to</p> <p>9 take another break or just power through it?</p> <p>10 Why don't we take a break and come back in 01:07:47</p> <p>11 ten minutes. Is that okay?</p> <p>12 THE VIDEOGRAPHER: Does anybody need more</p> <p>13 time than that?</p> <p>14 We can go off the record. We're off the</p> <p>15 record at 1:07 p.m. 01:07:55</p> <p>16 (Lunch recess.)</p> <p>17 THE VIDEOGRAPHER: We are on the record at</p> <p>18 1:43 p.m.</p> <p>19 BY MR. PAK:</p> <p>20 Q So far we talked about various examples of 01:43:32</p> <p>21 data networks and local area networks. And I just</p> <p>22 want to run by one more example with you to further</p> <p>23 understand what local area network means to a person</p> <p>24 of ordinary skill in the art.</p> <p>25 So the question here is, if -- if someone 01:43:49</p> <p style="text-align: right;">Page 152</p>
<p>1 Q So we have Figure 4 is also talking about</p> <p>2 data packets, right?</p> <p>3 A Figure 6, you mean?</p> <p>4 Q I'm sorry. So Figure 6 is also talking about</p> <p>5 data packets, right? 01:06:02</p> <p>6 A Yes, it is. It's showing the structure. If</p> <p>7 you have data packets, this is what they should look</p> <p>8 like.</p> <p>9 Q And the top of column 8, it says:</p> <p>10 "Figure 7 shows exemplary steps 01:06:12</p> <p>11 in a method for receiving data packets</p> <p>12 transmitted over a unidirectional</p> <p>13 network."</p> <p>14 Do you see that?</p> <p>15 A Yes. 01:06:20</p> <p>16 Q So Figure 7 is talking about data packets,</p> <p>17 correct?</p> <p>18 A Yes.</p> <p>19 Q So are there any figures in the '907</p> <p>20 patent -- in the '907 patent that doesn't talk about 01:06:32</p> <p>21 data packets?</p> <p>22 MR. KAPLAN: Object to form.</p> <p>23 THE WITNESS: My reference to this patent was</p> <p>24 not to address the data packet or not issue. It was</p> <p>25 to address unidirectional and bidirectional and 01:06:55</p> <p style="text-align: right;">Page 151</p>	<p>1 used two cups on a string to communicate with</p> <p>2 another person, does that amount to communicating</p> <p>3 over a local area network?</p> <p>4 A I thought we covered this in the morning.</p> <p>5 Q Yeah, we -- 01:44:01</p> <p>6 A I think we talked about it --</p> <p>7 Q Yeah, in the context of data network, but we</p> <p>8 haven't talked about it in the context of a local</p> <p>9 area network.</p> <p>10 A I mean, honestly, don't take it personally. 01:44:10</p> <p>11 It's a little bit of a silly example, over a string,</p> <p>12 but I guess if we -- if we use the definition that a</p> <p>13 person would use for networks, this is taking</p> <p>14 acoustic data and converting it to mechanical form</p> <p>15 and then -- to transmit, and then converting it back 01:44:40</p> <p>16 to acoustical at the other end. So in that sense,</p> <p>17 it is a data network.</p> <p>18 The criteria I use for whether it's a local</p> <p>19 area network is you have to have something to</p> <p>20 compare it to. So stretching the string out to a 01:45:00</p> <p>21 much larger area would produce a wider area string</p> <p>22 network, and this would be a local area network. So</p> <p>23 I think all those definitions are consistent.</p> <p>24 Q So communicating using a string, two cups on</p> <p>25 a string, would amount to a local area network in 01:45:28</p> <p style="text-align: right;">Page 153</p>

<p>1 your opinion?</p> <p>2 MR. KAPLAN: Objection. Mischaracterizes</p> <p>3 testimony. Asked and answered.</p> <p>4 THE WITNESS: Local -- the word "local" only</p> <p>5 makes sense if there's something else to compare it 01:45:43</p> <p>6 to that is bigger or smaller.</p> <p>7 And so, as I say, if there's a larger</p> <p>8 distance with bigger string, that would be a wide</p> <p>9 area network on a string and then this would be</p> <p>10 called local if it was a smaller one. But by 01:45:58</p> <p>11 itself, it's hard to say because you need a</p> <p>12 comparison.</p> <p>13 BY MR. PAK:</p> <p>14 Q Right. So depending on the length of the</p> <p>15 string that connects the two cups, right, someone 01:46:08</p> <p>16 that uses two cups on a string to communicate with</p> <p>17 another person, that would amount to communicating</p> <p>18 over a local area network, correct?</p> <p>19 MR. KAPLAN: Same objections.</p> <p>20 THE WITNESS: Well, I guess same answer. It 01:46:24</p> <p>21 depends. There's no -- there's no length of the</p> <p>22 string that would be -- there's no size of the -- of</p> <p>23 an actual LAN that we can say if you go past this,</p> <p>24 you're no longer local area. It's -- as we saw,</p> <p>25 LANs cover from a building to a hotel to a campus to 01:46:44</p> <p style="text-align: right;">Page 154</p>	<p>1 does not resolve the debate relating</p> <p>2 to the use of the term 'particular.'</p> <p>3 Q Okay. So I want to take a look at the</p> <p>4 prosecution history of the 615 patent. And just</p> <p>5 give me a minute to introduce the exhibit. 01:48:18</p> <p>6 Okay. So I've just uploaded here an exhibit</p> <p>7 marked as Exhibit 12.</p> <p>8 Do you see that?</p> <p>9 A Yes.</p> <p>10 (Exhibit 12 was marked for identification</p> <p>11 electronically and is attached hereto.)</p> <p>12 BY MR. PAK:</p> <p>13 Q Do you recognize this document?</p> <p>14 A Yes.</p> <p>15 Q Okay. So this is Appendix N of Dr. Schmidt's 01:48:56</p> <p>16 declaration, right?</p> <p>17 A Yes.</p> <p>18 Q You know, before we get into his response,</p> <p>19 you know, just generally speaking, why do you think</p> <p>20 an applicant would amend its claims during 01:49:14</p> <p>21 prosecution?</p> <p>22 MR. KAPLAN: Object to form.</p> <p>23 THE WITNESS: This sounds like a legal</p> <p>24 question to me.</p> <p>25 I don't know. Because of an error, because 01:49:40</p> <p style="text-align: right;">Page 156</p>
<p>1 a wide area complex.</p> <p>2 Same for this. It's a local area network</p> <p>3 compared to something that is a longer distance, for</p> <p>4 example, but I can't give you a number.</p> <p>5 BY MR. PAK: 01:47:03</p> <p>6 Q Sure. But if the string is -- so you're</p> <p>7 saying that depending on the length of the string,</p> <p>8 communicating using two cups attached to that string</p> <p>9 can either be a local area network or a wide area</p> <p>10 network then, correct? 01:47:18</p> <p>11 A Yeah, sure.</p> <p>12 Q Okay. So I want to go on to talk about the</p> <p>13 media particular playback system term. And if you</p> <p>14 take a look at paragraph 58 of your declaration. So</p> <p>15 we're going back to Exhibit 9. 01:47:39</p> <p>16 A Yes.</p> <p>17 Q Would you please read paragraph 58 for the</p> <p>18 record.</p> <p>19 A Yes.</p> <p>20 "I disagree with Dr. Schmidt that 01:47:51</p> <p>21 a POSITA would understand the media</p> <p>22 particular playback system of Claims</p> <p>23 3, 15 or 26 to mean media playback</p> <p>24 system. I have reviewed the</p> <p>25 prosecution history, but find that it 01:48:04</p> <p style="text-align: right;">Page 155</p>	<p>1 of additional facts, a response to the examiner.</p> <p>2 Those are some reasons I can think of.</p> <p>3 BY MR. PAK:</p> <p>4 Q Can you think of any other reasons why an</p> <p>5 applicant would amend its claims during prosecution? 01:49:57</p> <p>6 MR. KAPLAN: Object to form.</p> <p>7 THE WITNESS: No.</p> <p>8 BY MR. PAK:</p> <p>9 Q Well, look at this office action response.</p> <p>10 Do you think the applicant here amended its 01:50:21</p> <p>11 claims to overcome the cited references?</p> <p>12 A It's hard for me to speak on behalf of the</p> <p>13 applicant, the reasons that they had. I can only</p> <p>14 speak as to, you know, what I see written here.</p> <p>15 Is there a specific section you want me to 01:50:51</p> <p>16 look at?</p> <p>17 Q Yeah, so how about we take a look at the</p> <p>18 remarks on PDF page 15.</p> <p>19 A Okay.</p> <p>20 Q All right. Again, the summary of the office 01:51:10</p> <p>21 action, it says:</p> <p>22 "In the non-final office action</p> <p>23 mailed July 15, 2016, the examiner</p> <p>24 rejected Claims 1, 6 through 10, 15</p> <p>25 through 19, and 21 through 29 under 01:51:22</p> <p style="text-align: right;">Page 157</p>

<p>1 pre-AIA 35 U.S.C. Section 1038, as 2 being allegedly unpatentable over 3 DaCosta in view of Dua." 4 Do you see that? 5 A I see it. 01:51:39 6 Q And there are some other, you know, 103 7 rejections with respect to Claims 3, 12 and 20, 8 correct? 9 A Yes. 10 Q Okay. And then looking at Section 3, the 01:51:46 11 response to the 103 rejections, the second sentence 12 says: 13 "For at least the reason that 14 cited references do not teach the 15 subject matter currently recited by 01:52:11 16 applicant's claims, the pending 103 17 rejections should be withdrawn." 18 Do you see that? 19 A I see it. 20 Q Okay. And let's take a look at Claim 1 on 01:52:21 21 PDF page -- PDF page 3. 22 Do you see that the applicant amended 23 Claim 1, right? 24 A Is this the paragraph numbered 2? 25 Q I'm taking -- I'm looking at the amendments 01:52:53 Page 158</p>	<p>1 A I do. 2 Q Okay. And this is one of the patent 3 publications that was cited in the non-final office 4 action mailed July 25th, 2016. Correct? 5 A Yes. 01:55:06 6 Q Okay. And you reviewed this reference, 7 right? 8 A As I said, I read through it but mostly 9 looked at the comments. So I didn't review it in 10 the same way that I would review an actual patent in 01:55:21 11 this case, but I -- I'm familiar with it. 12 Q Sure, that's fair. 13 I want to take a look at paragraph 57, so on 14 PDF page 24. Would you please read the second 15 sentence in paragraph 57. 01:55:47 16 A The second sentence? 17 Q Yes. 18 A Okay. 19 "The term 'media player' 20 generally refers to electronic devices 01:56:04 21 that are capable of processing media 22 such as audio, video, images, 23 presentations, animation, and internet 24 content, for example, cellular phones, 25 personal digital assistants (PDAs), 01:56:17 Page 160</p>
<p>1 to the claims on PDF page 3. 2 A Oh, sorry, 3. 3 I see it, yes. 4 Q Do you think the applicant here amended 5 Claim 1 to overcome the cited references? 01:53:05 6 A So I probably looked through the cited 7 references, but I don't have them at the tip of my 8 tongue at the moment to be able to answer that 9 accurately. 10 Q Okay. Did you review any of the cited 01:53:26 11 references? 12 A I read through them. I wouldn't say that I 13 reviewed them in the same way that I reviewed the 14 patents. 15 Q Okay. So, again, I want to -- how about I 01:53:41 16 introduce one of the cited references and discuss 17 that. Just give me a minute. 18 I just uploaded an exhibit and marked it as 19 Exhibit 13. 20 Do you see that? 01:54:24 21 A Yes. 22 (Exhibit 13 was marked for identification 23 electronically and is attached hereto.) 24 BY MR. PAK: 25 Q Do you recognize this document? 01:54:35 Page 159</p>	<p>1 music players, game players, video 2 players, cameras and the like." 3 Q Okay. And I want to skip to paragraph 142 4 now. It's on PDF page 32. 5 A Yes. 01:56:41 6 Q Would you please read that first sentence on 7 paragraph 142. 8 A Yes. 9 "Finally, the device's media 10 processing capabilities 461 are listed 01:56:47 11 in the RFID transmission data 450. 12 This is" -- 13 Q Actually, please keep going. Read the second 14 sentence. 15 A 01:56:58 16 "This information indicates the 17 device's ability to process media 18 assets that are in specific formats." 19 Q Okay. And the patent further discusses some 20 example media formats, correct? 01:57:11 21 A Correct. 22 MR. KAPLAN: Object to form. 23 THE WITNESS: It does. 24 BY MR. PAK: 25 Q And looking at paragraph 143, could you 01:57:18 Page 161</p>

<p>1 please read the first sentence.</p> <p>2 A</p> <p>3 "This type of information allows</p> <p>4 media player 100 to only transmit</p> <p>5 media assets which are supported by 01:57:28</p> <p>6 the target devices."</p> <p>7 Q Would you please read the second sentence in</p> <p>8 full.</p> <p>9 A Oh, sure.</p> <p>10 "This information also 01:57:38</p> <p>11 allows either or both of the target</p> <p>12 device and media player 100 to convert</p> <p>13 media assets into supported formats</p> <p>14 before transmission to the other when</p> <p>15 required." 01:57:59</p> <p>16 Q Okay. So based on, you know, these -- this</p> <p>17 disclosure that we -- that I just had you read, do</p> <p>18 you agree that Dua disclosed a media player that can</p> <p>19 play particular media formats?</p> <p>20 A Yes. 01:58:20</p> <p>21 Q Do you agree that Dua disclosed a media</p> <p>22 player that can play particular types of media?</p> <p>23 A They disclosed a --</p> <p>24 MR. KAPLAN: Object to form.</p> <p>25 THE WITNESS: They disclosed a -- the ability 01:58:33</p> <p style="text-align: right;">Page 162</p>	<p>1 THE WITNESS: Well, under audio, they list</p> <p>2 specific formats for that audio, but not all</p> <p>3 possible. So I think "any" might be too broad</p> <p>4 because they don't list -- it's hard to say.</p> <p>5 BY MR. PAK: 02:00:11</p> <p>6 Q All right. But Dua discloses a media player</p> <p>7 that can play different types of multimedia, right?</p> <p>8 A Right, different types of audio, different</p> <p>9 types of video, and graphics.</p> <p>10 Q Okay. So now let's go back to the office 02:00:32</p> <p>11 action response, Exhibit 12.</p> <p>12 And I want to take a look at Claim 3. And</p> <p>13 it's on PDF page 4.</p> <p>14 Do you see that?</p> <p>15 A Yes. 02:00:59</p> <p>16 Q What amendments did the applicant make to</p> <p>17 Claim 3?</p> <p>18 MR. KAPLAN: Object to form.</p> <p>19 THE WITNESS: I'm sorry, Claim 3, PDF page 4</p> <p>20 starts -- is a half paragraph. No, no, sorry. 02:01:15</p> <p>21 BY MR. PAK:</p> <p>22 Q Yeah, so Claim 3, you know, starts from PDF</p> <p>23 page 4 and ends at PDF page 5, right?</p> <p>24 A Yes.</p> <p>25 Q Okay. So what -- so looking at the 02:01:33</p> <p style="text-align: right;">Page 164</p>
<p>1 to play back multiple different types of media.</p> <p>2 I think that's what you're asking, yes?</p> <p>3 BY MR. PAK:</p> <p>4 Q Right. So just to clarify, so does -- do you</p> <p>5 agree Dua discloses a media player that can play 01:58:48</p> <p>6 particular types of media?</p> <p>7 MR. KAPLAN: Object to form.</p> <p>8 THE WITNESS: I guess I'm trying to</p> <p>9 understand how you're using the word "particular"</p> <p>10 here. 01:59:13</p> <p>11 It's -- they list a number of media by</p> <p>12 example, but it's not clear to me that they're</p> <p>13 excluding others. So I'm not sure how to answer</p> <p>14 that.</p> <p>15 BY MR. PAK: 01:59:27</p> <p>16 Q Yeah, so let me reword this.</p> <p>17 Does Dua disclose a media player that can</p> <p>18 play audio?</p> <p>19 A Yes.</p> <p>20 Q Does Dua disclose a media player that can 01:59:39</p> <p>21 play video?</p> <p>22 A Yes.</p> <p>23 Q So Dua discloses a media player that can play</p> <p>24 any particular type of media, right?</p> <p>25 MR. KAPLAN: Object to the form. 01:59:55</p> <p style="text-align: right;">Page 163</p>	<p>1 amendments to Claim 3, could you please walk through</p> <p>2 all the amendments the applicant made in this office</p> <p>3 action response.</p> <p>4 MR. KAPLAN: Objection. The document speaks</p> <p>5 for itself. 02:01:50</p> <p>6 THE WITNESS: I assume it's the underlined</p> <p>7 words of the amendment.</p> <p>8 BY MR. PAK:</p> <p>9 Q Yeah. So, you know, I'm not trying to trick</p> <p>10 you here. So the underlined -- the underlined words 02:01:59</p> <p>11 represent words that were added.</p> <p>12 A Okay.</p> <p>13 Q And the strike -- and the strike through</p> <p>14 represents terms, phrases that were deleted.</p> <p>15 So I really just want, you know, to go over 02:02:14</p> <p>16 all the amendments. You know, can you walk through</p> <p>17 what amendments were made.</p> <p>18 A Sure. So they added the word "particular" in</p> <p>19 several places. "Particular playback device."</p> <p>20 "Media particular playback system." 02:02:36</p> <p>21 And then "wherein the first zone includes the</p> <p>22 particular playback device."</p> <p>23 So all the additions have to do with</p> <p>24 "particular" except for the last one that they</p> <p>25 added, "playing back multimedia content in 02:02:55</p> <p style="text-align: right;">Page 165</p>

<p>1 synchrony."</p> <p>2 And then they removed "initiating playback"</p> <p>3 in two locations.</p> <p>4 Q Okay. So looking at the amendments to</p> <p>5 Claim 3, do you agree that the applicant added the 02:03:13</p> <p>6 word "particular" in front of the word "playback"</p> <p>7 throughout Claim 3?</p> <p>8 A Yes, except for one location, second to the</p> <p>9 last line.</p> <p>10 MR. KAPLAN: Object to form. 02:03:34</p> <p>11 THE WITNESS: Actually in a couple places.</p> <p>12 It's not every "playback" that has "particular."</p> <p>13 It's selective. The word "particular" was not added</p> <p>14 in front of every time "playback" appears. Only</p> <p>15 some. 02:03:53</p> <p>16 BY MR. PAK:</p> <p>17 Q Well, the word "particular" was -- all right,</p> <p>18 I see.</p> <p>19 So where it says "at least one additional</p> <p>20 playback device," you're saying it doesn't say "at 02:04:02</p> <p>21 least one additional particular playback device."</p> <p>22 Is that right?</p> <p>23 A Oh, that wasn't the only -- the second to</p> <p>24 last line of the previous page, where it says</p> <p>25 "control playback by the playback device," they did 02:04:22</p> <p style="text-align: right;">Page 166</p>	<p>1 amended "media playback system" to "media particular</p> <p>2 playback system"?</p> <p>3 MR. KAPLAN: Object to form. Scope.</p> <p>4 THE WITNESS: So are you asking if I had read</p> <p>5 this without the word "particular" in the amendment, 02:06:05</p> <p>6 would I still have the same opinion? Is that --</p> <p>7 BY MR. PAK:</p> <p>8 Q Yeah. So, you know, before this claim was</p> <p>9 amended, right, you know, it used the term "media</p> <p>10 playback system" instead of "media particular 02:06:19</p> <p>11 playback system," right?</p> <p>12 A Right.</p> <p>13 Q So before Claim 3 was amended to use --</p> <p>14 amended to use "media particular playback system,"</p> <p>15 would a person of ordinary skill in the art 02:06:35</p> <p>16 understand Claim 3? That's what I'm trying to ask.</p> <p>17 A Right. Probably. Although I'm kind of</p> <p>18 reforming an opinion by just quickly reading through</p> <p>19 this paragraph, but I'm just reading it as if the</p> <p>20 word "particular" isn't there, and it would just be 02:07:13</p> <p>21 "media playback," right?</p> <p>22 Q Right. So if you substituted the "particular</p> <p>23 playback system" back to "media playback system," a</p> <p>24 person of ordinary skill in the art would understand</p> <p>25 Claim 3, correct? 02:07:29</p> <p style="text-align: right;">Page 168</p>
<p>1 not add the word "particular" there.</p> <p>2 Q Is "media playback system" a broader term</p> <p>3 than "media particular playback system"?</p> <p>4 A That's --</p> <p>5 MR. KAPLAN: Object to form. 02:04:41</p> <p>6 THE WITNESS: That's the part that was</p> <p>7 difficult to ascertain. So that is one way to</p> <p>8 interpret that, that it plays back only particular</p> <p>9 media.</p> <p>10 The other one is that there's all kinds of 02:04:56</p> <p>11 playback systems, and I provided an example. It</p> <p>12 plays -- records and plays back other kind of data</p> <p>13 that is not media. And this would be particular to</p> <p>14 media.</p> <p>15 So it can be particular to all kinds of 02:05:08</p> <p>16 media, particular to one media, or a typographical</p> <p>17 error, as was indicated by Sonos. I couldn't tell</p> <p>18 which of those three -- and there may be others.</p> <p>19 And that was the reason for my opinion.</p> <p>20 BY MR. PAK: 02:05:26</p> <p>21 Q Sure. So before Claim 3 was amended in this</p> <p>22 office action response, do you think Claim 3 was</p> <p>23 indefinite?</p> <p>24 So, you know, let me ask it this way. Do you</p> <p>25 think Claim 3 was indefinite before the applicant 02:05:42</p> <p style="text-align: right;">Page 167</p>	<p>1 A Well, but they didn't have "media playback</p> <p>2 system" in Claim 3. It's not like they substituted.</p> <p>3 They just added the word "particular" in front of</p> <p>4 "playback," right?</p> <p>5 Am I reading that correctly? 02:07:46</p> <p>6 Q Yeah. Well, it says "a media particular</p> <p>7 playback system," right, currently, as amended?</p> <p>8 Do you see that?</p> <p>9 How about you read the first four lines of</p> <p>10 the claim before you get to the "wherein" clause. 02:08:21</p> <p>11 A Wait, I'm sorry, am I looking at the same</p> <p>12 paragraph?</p> <p>13 Q Yes, it's --</p> <p>14 A This is the bottom of page 3 in the document,</p> <p>15 that paragraph, right? 02:08:35</p> <p>16 Q Right. So let me read -- let me read Claim 3</p> <p>17 as amended.</p> <p>18 A Okay.</p> <p>19 Q It says:</p> <p>20 "The method of Claim 1 wherein 02:08:40</p> <p>21 detecting the set of inputs to</p> <p>22 transfer playback from the control</p> <p>23 device to the particular playback</p> <p>24 device comprises detecting a set of</p> <p>25 inputs to transfer playback from the 02:08:52</p> <p style="text-align: right;">Page 169</p>

<p>1 control device to a particular zone</p> <p>2 group of a media particular playback</p> <p>3 system that includes a first zone and</p> <p>4 a second zone."</p> <p>5 Do you see that? 02:09:01</p> <p>6 A Yes.</p> <p>7 Q Okay. Before that -- before that claim</p> <p>8 limitation was written, right, it said "a media</p> <p>9 playback system," not "a media particular playback</p> <p>10 system," correct? 02:09:18</p> <p>11 A Correct.</p> <p>12 Q So if we changed "a media particular playback</p> <p>13 system" back to "a media playback system," would a</p> <p>14 person of ordinary skill in the art understand what</p> <p>15 Claim 3 means? 02:09:35</p> <p>16 A The problem is I was assuming your question</p> <p>17 meant to remove all "particulars." But you're</p> <p>18 saying just to remove the one?</p> <p>19 I think I can agree that "media playback" is</p> <p>20 more general than "media particular." 02:10:30</p> <p>21 Q Right. So you understand this claim -- you</p> <p>22 understand Claim 3 if it didn't say "media</p> <p>23 particular playback system" and instead it said</p> <p>24 "media playback system," correct?</p> <p>25 A I would understand it better, yes. 02:11:01</p> <p style="text-align: right;">Page 170</p>	<p>1 of media formats and different types of media?</p> <p>2 MR. KAPLAN: Objection. Asked and answered.</p> <p>3 THE WITNESS: Yeah, I don't know the strategy</p> <p>4 they had in amending the claim.</p> <p>5 BY MR. PAK: 02:12:48</p> <p>6 Q But do you agree with me that amending "media</p> <p>7 playback system" to "media particular playback</p> <p>8 system" would not overcome the teachings of Dua?</p> <p>9 MR. KAPLAN: Object to form.</p> <p>10 THE WITNESS: It depends how they conceive -- 02:13:07</p> <p>11 or perceive the word "particular". If they were</p> <p>12 trying to make this broader than the formats that</p> <p>13 Dua was listing, then maybe that was their strategy.</p> <p>14 So in their mind, they're trying to say it's</p> <p>15 broader. 02:13:26</p> <p>16 But, again, I don't -- I don't know why they</p> <p>17 used the word "particular".</p> <p>18 BY MR. PAK:</p> <p>19 Q What does it mean to play a particular media</p> <p>20 format? 02:13:43</p> <p>21 A To play a particular media format? It means</p> <p>22 the system is instructed to start playing that</p> <p>23 format, that content in that format.</p> <p>24 Q So does Dua disclose a system that's</p> <p>25 instructed to start playing a particular media 02:14:17</p> <p style="text-align: right;">Page 172</p>
<p>1 Q Do you think the applicant amended "media</p> <p>2 playback system" to "media particular playback</p> <p>3 system" to overcome the cited references?</p> <p>4 A I don't know how to answer that. You'd have</p> <p>5 to ask the applicant. 02:11:25</p> <p>6 Q Well, we talked about the Dua reference,</p> <p>7 right?</p> <p>8 A Yes.</p> <p>9 Q And the Dua reference disclosed a media</p> <p>10 player that can play particular media formats, 02:11:33</p> <p>11 right?</p> <p>12 A Right.</p> <p>13 Q And we talked --</p> <p>14 A But there are many ways to respond to it. So</p> <p>15 I don't know if that was the only reason, is what 02:11:51</p> <p>16 I'm trying to say. I can't put myself in their</p> <p>17 shoes.</p> <p>18 Q Right. But you understand that Dua discloses</p> <p>19 a media player that can play different kinds of</p> <p>20 media formats and different types of media, right? 02:12:08</p> <p>21 A Yes.</p> <p>22 Q So why do you think the applicant amended</p> <p>23 "media playback system" to be a particular system --</p> <p>24 "a media particular playback system" if Dua already</p> <p>25 teaches a media player that can play different kinds 02:12:28</p> <p style="text-align: right;">Page 171</p>	<p>1 format?</p> <p>2 A He does. And he lists examples of those</p> <p>3 formats.</p> <p>4 Q What does it mean to play a particular type</p> <p>5 of media? 02:14:35</p> <p>6 A Isn't that the same answer -- or the same</p> <p>7 question? I'm not sure -- as opposed to the format</p> <p>8 you mean?</p> <p>9 Q Yeah. So, you know, there's -- you can play</p> <p>10 a particular type of media format, right, and that 02:14:55</p> <p>11 would be like an MP3 or 4 and the like, correct?</p> <p>12 But you can also play a particular type of media,</p> <p>13 which could be video or audio, text and the like,</p> <p>14 correct? Do you follow?</p> <p>15 A Yes. 02:15:13</p> <p>16 MR. KAPLAN: Object to form.</p> <p>17 BY MR. PAK:</p> <p>18 Q Okay. So in that context, does Dua disclose</p> <p>19 a system that can play a particular type of media?</p> <p>20 A He discloses several types of media, 02:15:40</p> <p>21 pictures, images, PowerPoint presentations, audio,</p> <p>22 video. Yes.</p> <p>23 Q So when the applicant amended "media playback</p> <p>24 system" to "media particular playback system," would</p> <p>25 you agree with me that amending "media playback 02:16:11</p> <p style="text-align: right;">Page 173</p>

<p>1 system" to "media particular playback system" would 2 not overcome the teachings of Dua? 3 MR. KAPLAN: Objection. Asked and answered. 4 THE WITNESS: I mean, that's a tough call. 5 That's why we have examiners, right? I don't know 02:16:31 6 if I can make that call. 7 BY MR. PAK: 8 Q Well, are there any other reasons why the 9 applicant would amend "media playback system" to 10 "media particular playback system"? 02:16:53 11 A Other than trying to respond to the examiner 12 or -- as I said, you know, that would be one reason. 13 Or they thought they had made an error and they're 14 trying to correct it. Those are the two main 15 reasons in my head. 02:17:10 16 Q Okay. So take a look at PDF page 15 again, 17 "Summary of the Office Action". 18 A Yes. 19 Q In the "Summary of the Office Action," it 20 talks about 103 rejections, correct? 02:17:34 21 A Yes. 22 Q Do you see any other rejections? 23 A I'm sorry, can you remind me what the 103 24 rejection is? 25 Q Yeah. So 103 rejection is an obviousness 02:17:48 Page 174</p>	<p>1 Q Right. 2 A Paragraph 3? 3 Q Yeah. And looking at Claim 3, you're not 4 entirely sure why the applicant amended "media 5 playback system" to "media particular playback 02:19:12 6 system," correct? 7 A I'm not sure, no. 8 Q But you do understand that Dua discloses a 9 media particular playback system, correct? 10 A Correct. But I guess the question is, is 02:19:29 11 that the only way to respond to that rejection? 12 Without being the applicant and knowing more, I 13 couldn't answer that. 14 But it was a response presumably to address 15 the concern. That doesn't make it the correct 02:19:42 16 response. It's a response. 17 Q Right. And the only other reason why an 18 applicant would amend its claims, other than 19 responding to an examiner, would be to correct an 20 informality, such as a typographical error, correct? 02:19:59 21 MR. KAPLAN: Object to form. 22 Mischaracterizes. Leading. 23 Go ahead. 24 THE WITNESS: Those are two reasons I have 25 off the top of my head. I mean, there could be 02:20:12 Page 176</p>
<p>1 type rejection. 2 There's also 102 type rejections, which could 3 be anticipation -- anticipatory type rejections, 4 right? 5 And then you also have 112 rejections, which 02:18:02 6 might have to do with, you know, formality of the 7 claims or, you know, maybe the patent lacks written 8 description of enablement and the like. Or it might 9 be indefinite, right? 10 A Right. Okay. 02:18:18 11 Q All right. So with that understanding here, 12 do you see in the Summary of the Office Action there 13 are only 103 rejections, right? 14 A Right. 15 Q And you don't see any 112 rejections, 02:18:28 16 correct? 17 A Correct. 18 Q So the -- so the applicant here was 19 responding to the examiner's 103 rejections in the 20 non-final office action of July 25, 2016, correct? 02:18:44 21 MR. KAPLAN: Object to form. 22 THE WITNESS: Yes. I presume that's what -- 23 the response that was written by the applicant, 24 right? 25 BY MR. PAK: 02:18:56 Page 175</p>	<p>1 other reasons that I'm not -- I don't think those 2 are the only two reasons to list. 3 BY MR. PAK: 4 Q Sitting here today, can you think of any 5 other reasons why an applicant would amend its 02:20:24 6 claims other than those two reasons? 7 A I don't know. The marketing department 8 decided that it would be important to have certain 9 words in the patent? 10 I'm thinking -- I'm trying to think of other 02:20:41 11 reasons. There could be a lot of other reasons. It 12 depends. They become a public record, obviously, so 13 that could be another reason. 14 Q Why do you think the applicant would amend 15 "media playback system" to "media particular 02:20:59 16 playback system" if amending "media playback system" 17 to "media particular playback system" would render 18 the claim indefinite, in your opinion? 19 A Well, I don't think they asked me my opinion, 20 so how would they know that this would become an 02:21:22 21 issue? 22 At the time, I'm sure it made sense to them 23 for some reason that we don't know, that I don't 24 know. 25 Q That's fair. 02:21:31 Page 177</p>

<p>1 Now, I want to go back to the '206 patent</p> <p>2 now. It's Exhibit 10. And I want to take a look at</p> <p>3 column 8.</p> <p>4 A Okay.</p> <p>5 Q Okay. And you don't have to read this out 02:22:11</p> <p>6 loud, but could you please review lines 7</p> <p>7 through 36.</p> <p>8 A 7 through 36?</p> <p>9 Q Yeah. And then we can discuss.</p> <p>10 And just let us know when you're finished. 02:22:35</p> <p>11 A Okay.</p> <p>12 Q Okay. Does the '206 patent disclose two</p> <p>13 mechanisms for grouping zone players?</p> <p>14 MR. KAPLAN: Object to the form.</p> <p>15 THE WITNESS: I'm trying to see where it 02:23:34</p> <p>16 says another mechanism. I see what it says, but it</p> <p>17 starts -- the line starts with "One mechanism for</p> <p>18 joining zone players."</p> <p>19 BY MR. PAK:</p> <p>20 Q Sure. And what is that one mechanism? 02:23:46</p> <p>21 A It says:</p> <p>22 "To link a number of zone players</p> <p>23 together to form a group."</p> <p>24 Q And what does the '206 patent say that one</p> <p>25 mechanism entails to link a number of zone players 02:24:07</p> <p style="text-align: right;">Page 178</p>	<p>1 Q What are the example zones disclosed in</p> <p>2 column 8?</p> <p>3 A Bathroom, bedroom, den, dining room, family</p> <p>4 room and foyer.</p> <p>5 Q Okay. And looking at column 8, line 29, 02:25:45</p> <p>6 could you please read that -- read the first three</p> <p>7 sentences.</p> <p>8 A Okay.</p> <p>9 "For instance, a Morning zone</p> <p>10 scene/configuration command would link 02:26:09</p> <p>11 the bedroom, den and dining room</p> <p>12 together in one action. Without this</p> <p>13 single command, the user would need to</p> <p>14 manually and individually link each</p> <p>15 zone. Figure 3A provides an 02:26:21</p> <p>16 illustration of one zone scene where</p> <p>17 the left column shows the starting</p> <p>18 zone grouping. All zones are</p> <p>19 separate. The column on the right</p> <p>20 shows the effects of grouping the 02:26:35</p> <p>21 zones to make a group of three zones</p> <p>22 named after Morning."</p> <p>23 Q Okay. So I want to take a look at Figure 3A</p> <p>24 now. It's on PDF page 8.</p> <p>25 A Yes. 02:27:06</p> <p style="text-align: right;">Page 180</p>
<p>1 together to form a group?</p> <p>2 A So they -- one second.</p> <p>3 "The user may manually link each</p> <p>4 zone player or room one after the</p> <p>5 other," sequentially presumably. 02:24:24</p> <p>6 Q So that's the -- that's the one mechanism</p> <p>7 disclosed in the '206 patent, right?</p> <p>8 A Yeah.</p> <p>9 MR. KAPLAN: Object to form.</p> <p>10 BY MR. PAK: 02:24:37</p> <p>11 Q Is there another mechanism for linking a</p> <p>12 number of zone players together to form a group?</p> <p>13 A I guess you must be referring to line 23</p> <p>14 perhaps:</p> <p>15 "According to one embodiment, a 02:24:57</p> <p>16 set of zones can be dynamically linked</p> <p>17 together using one command."</p> <p>18 Is that the other mechanism that you're</p> <p>19 referring to?</p> <p>20 Q Yes. 02:25:16</p> <p>21 A Okay.</p> <p>22 Q So the '206 patent discloses example zones,</p> <p>23 correct?</p> <p>24 A Right. They have a list of what they call</p> <p>25 zones and then some names, yeah. 02:25:30</p> <p style="text-align: right;">Page 179</p>	<p>1 Q So on the left side of the arrow, you know, I</p> <p>2 see bathroom, bedroom, den, dining room, family room</p> <p>3 and foyer, right?</p> <p>4 A Yes.</p> <p>5 Q What do -- what does the left side of the 02:27:17</p> <p>6 arrow represent, or those rooms represent?</p> <p>7 A Based on what we just read, they call them</p> <p>8 zones.</p> <p>9 Q And the right side of the arrow -- well, what</p> <p>10 does -- what does the right side of the arrow 02:27:42</p> <p>11 indicate in Figure 3A?</p> <p>12 MR. KAPLAN: Object to form.</p> <p>13 THE WITNESS: It's the same -- the same</p> <p>14 zones, but the -- but three of them have been put in</p> <p>15 a -- some kind of group. And that group is -- has 02:27:54</p> <p>16 the bracket that indicates that it's called Zone</p> <p>17 Configuration/Scene.</p> <p>18 BY MR. PAK:</p> <p>19 Q What are -- what are the three zones that are</p> <p>20 put into some kind of group? 02:28:22</p> <p>21 A Bedroom, den and dining room.</p> <p>22 Q Do you know what the name of that -- what the</p> <p>23 patent describes as -- let me start over.</p> <p>24 What does the patent call this group that</p> <p>25 includes the three zones, bedroom, den and dining 02:28:49</p> <p style="text-align: right;">Page 181</p>

<p>1 room?</p> <p>2 A Sorry, what was that column? Was it</p> <p>3 column 8?</p> <p>4 Q Yes, column 8.</p> <p>5 A And it says "to make a group of three zones 02:29:03</p> <p>6 named after Morning." A little odd that the word</p> <p>7 "after" is there, but okay.</p> <p>8 Q Yeah, go -- look at the sentence before. You</p> <p>9 know, it says:</p> <p>10 "Figure 3A provides an 02:29:32</p> <p>11 illustration of one zone scene where</p> <p>12 the left column shows the starting</p> <p>13 zone grouping. All zones are</p> <p>14 separate. The column to the right</p> <p>15 shows the effect of grouping the zones 02:29:45</p> <p>16 to make a group of three zones named</p> <p>17 after Morning."</p> <p>18 Right?</p> <p>19 A Right.</p> <p>20 Q So looking at Figure 3A, the group of zones, 02:29:52</p> <p>21 bedroom, den and dining room, that's an illustration</p> <p>22 of a zone scene, correct?</p> <p>23 MR. KAPLAN: Object to form.</p> <p>24 THE WITNESS: So I didn't provide an opinion</p> <p>25 on what a zone scene is. To define that here kind 02:30:26</p> <p style="text-align: right;">Page 182</p>	<p>1 Q So with respect to Figure 3A, you know, the</p> <p>2 group of three zones named after Morning, that's</p> <p>3 referring to the Morning zone scene, correct?</p> <p>4 MR. KAPLAN: Object to form. Asked and</p> <p>5 answered. 02:31:52</p> <p>6 THE WITNESS: Well, but it has -- in line 29</p> <p>7 it says "Morning zone scene/configuration," and then</p> <p>8 in Figure 3A it says "zone configuration/scene," the</p> <p>9 other way around.</p> <p>10 So I couldn't tell from this for sure without 02:32:13</p> <p>11 looking further if that is the definition of zone</p> <p>12 scene or not. It has additional stuff.</p> <p>13 BY MR. PAK:</p> <p>14 Q Right. But your understanding of a zone</p> <p>15 scene is that it's some kind of representation of a 02:32:28</p> <p>16 grouping that has some additional attributes, right?</p> <p>17 A Yes, that's my best understanding. The</p> <p>18 attributes having to do with what throughout the</p> <p>19 specification is called some kind of themes.</p> <p>20 Q Why don't we take a look at column 10 of the 02:32:49</p> <p>21 patent.</p> <p>22 A Okay.</p> <p>23 Q And I want to look at line 21 here. It says:</p> <p>24 "Given a saved scene, a user may</p> <p>25 activate the scene at any time or set 02:33:21</p> <p style="text-align: right;">Page 184</p>
<p>1 of on the fly would be a little premature, or I'd</p> <p>2 have to look at it more.</p> <p>3 You know, reading through for the -- for the</p> <p>4 other opinions that I formed, I found that zone</p> <p>5 scene represents some kind of grouping, but it has 02:30:43</p> <p>6 something additional, some kind of theme or</p> <p>7 attributes that go beyond a simple grouping.</p> <p>8 But, again, that's not a -- that's not an</p> <p>9 official opinion yet.</p> <p>10 BY MR. PAK: 02:30:59</p> <p>11 Q Okay. So, you know, looking at column 8, you</p> <p>12 know, where we were before, and it says:</p> <p>13 "For instance, a Morning zone</p> <p>14 scene/configuration command would link</p> <p>15 the bedroom, den and dining room 02:31:14</p> <p>16 together in one action."</p> <p>17 Do you see that?</p> <p>18 A Yes.</p> <p>19 Q And then, you know, as we discussed, it says:</p> <p>20 "The column to the right shows 02:31:24</p> <p>21 the effects of grouping the zones to</p> <p>22 make a group of three zones named</p> <p>23 after Morning."</p> <p>24 Do you see that?</p> <p>25 A I see. 02:31:32</p> <p style="text-align: right;">Page 183</p>	<p>1 up a timer to activate the scene at</p> <p>2 610."</p> <p>3 Do you see that?</p> <p>4 A I see it.</p> <p>5 Q After the user activates the scene, what does 02:33:29</p> <p>6 the '206 patent say happens next?</p> <p>7 A So they say "scene" here, which is not clear</p> <p>8 if they mean zone scene in their own language.</p> <p>9 That's my first thought.</p> <p>10 But what -- you're saying what do they say 02:33:59</p> <p>11 in this sentence?</p> <p>12 Q Yeah, so let's back up here.</p> <p>13 And, you know, this is talking about with</p> <p>14 respect to Figure 6, but at the -- you know, the</p> <p>15 first paragraph of column 10, says: 02:34:14</p> <p>16 "The process 600 is initiated</p> <p>17 only when a user decides to proceed</p> <p>18 with a zone scene at 602."</p> <p>19 Do you see that?</p> <p>20 A Yes. 02:34:26</p> <p>21 Q So when it talks about a scene at step 610,</p> <p>22 it's talking about a zone scene, correct?</p> <p>23 MR. KAPLAN: Object to form.</p> <p>24 THE WITNESS: Probably, but why don't they</p> <p>25 just write it to make it clear? It's not -- most 02:34:50</p> <p style="text-align: right;">Page 185</p>

<p>1 likely is my answer.</p> <p>2 BY MR. PAK:</p> <p>3 Q Okay. So at 610, you know, I read this</p> <p>4 before. It says:</p> <p>5 "Given a saved scene, a user may 02:35:11</p> <p>6 activate the scene at any time or set</p> <p>7 up a timer to activate the scene at</p> <p>8 610."</p> <p>9 So what does the '206 patent say happens</p> <p>10 next? 02:35:25</p> <p>11 A After this action has happened?</p> <p>12 Q Yes.</p> <p>13 A It's the next couple of sentences, right?</p> <p>14 Q So what does that say?</p> <p>15 A So line 24: 02:35:44</p> <p>16 "At 612, upon the activation of a</p> <p>17 saved scene, the process 600 checks</p> <p>18 the status of the players associated</p> <p>19 with the scene."</p> <p>20 Q Okay. So what does -- what does the patent 02:35:56</p> <p>21 say happens at step 614?</p> <p>22 A</p> <p>23 "At 614, commands are executed</p> <p>24 with the parameters, e.g., pertaining</p> <p>25 to a playlist and volumes." 02:36:11</p> <p style="text-align: right;">Page 186</p>	<p>1 Q I think -- I think member -- so member here</p> <p>2 is referring to devices or nodes on the network,</p> <p>3 right?</p> <p>4 A Okay.</p> <p>5 Q So you agree with me that after a user 02:37:36</p> <p>6 activates a zone scene, data is transported from a</p> <p>7 member, for example, a controller or a player, to</p> <p>8 other members in the zone scene, right?</p> <p>9 A Yes.</p> <p>10 Q And what does that data that is transported 02:37:57</p> <p>11 from a member to another member pertain to?</p> <p>12 A Well, in the example they provide, it says it</p> <p>13 pertains to a playlist and volumes. So we have to</p> <p>14 read it the way they say it, right?</p> <p>15 Q Yeah. So let's take a look at column 10, 02:38:23</p> <p>16 lines 12 through 20. It starts with "In the example</p> <p>17 of Figure 1."</p> <p>18 Do you see that?</p> <p>19 A Yes.</p> <p>20 Q Could you please read the first two 02:38:35</p> <p>21 sentences.</p> <p>22 A</p> <p>23 "In the example of Figure 1, the</p> <p>24 scene is saved in one of the zone</p> <p>25 players and displayed on controller 02:38:43</p> <p style="text-align: right;">Page 188</p>
<p>1 Q And what is the next --</p> <p>2 A Yeah, go ahead?</p> <p>3 Q Can you keep reading the next two sentences.</p> <p>4 A Yes.</p> <p>5 "In one embodiment, data, 02:36:23</p> <p>6 including the parameters, is</p> <p>7 transported from a member, e.g., a</p> <p>8 controller, to other members in the</p> <p>9 scene so that the players are caused</p> <p>10 to synchronize an operation configured 02:36:34</p> <p>11 in the scene. The operation may cause</p> <p>12 all players to play back a song in</p> <p>13 identical or different volumes or to</p> <p>14 play back a pre-stored file."</p> <p>15 Q So after a user activates a zone scene, data 02:36:51</p> <p>16 is transported from a member to another member in</p> <p>17 the zone scene, right?</p> <p>18 MR. KAPLAN: Object to form.</p> <p>19 THE WITNESS: So what is a member here?</p> <p>20 BY MR. PAK:</p> <p>21 Q So a member here -- you know, you just read</p> <p>22 it here. It says "transferred from a member, for</p> <p>23 example, a controller."</p> <p>24 A member can also be a player, right?</p> <p>25 A Okay. 02:37:24</p> <p style="text-align: right;">Page 187</p>	<p>1 142. In operation, a set of data</p> <p>2 pertaining to the scene includes a</p> <p>3 plurality of parameters. In one</p> <p>4 embodiment, the parameters include,</p> <p>5 but may not be limited to, 02:38:56</p> <p>6 identifiers, e.g., IP address, of the</p> <p>7 associated players and a playlist.</p> <p>8 The parameter may also include</p> <p>9 volume/tonne settings for the</p> <p>10 associated players in the scene." 02:39:08</p> <p>11 Q Okay. So returning to my question, after a</p> <p>12 user activated a zone scene, there is some data that</p> <p>13 is transported from a member to another member in</p> <p>14 the scene, right?</p> <p>15 MR. KAPLAN: Object to form. 02:39:27</p> <p>16 THE WITNESS: That's what this paragraph</p> <p>17 seems to describe, yes.</p> <p>18 BY MR. PAK:</p> <p>19 Q Right. And that data that's transported from</p> <p>20 a member to another member is data pertaining to a 02:39:36</p> <p>21 zone scene, correct?</p> <p>22 MR. KAPLAN: Object to form.</p> <p>23 THE WITNESS: Well, it's data -- it's a set</p> <p>24 of parameters that they want to apply to that zone</p> <p>25 scene they're sending. 02:39:58</p> <p style="text-align: right;">Page 189</p>

<p>1 BY MR. PAK:</p> <p>2 Q Right. So let me ask you this way.</p> <p>3 So when a scene is saved in one of the zone</p> <p>4 players and displayed on a controller, right, there</p> <p>5 is some form of data pertaining to that zone scene 02:40:12</p> <p>6 that gets saved in the zone player, right?</p> <p>7 MR. KAPLAN: Object to form.</p> <p>8 THE WITNESS: This is not the data that we're</p> <p>9 talking about here that's being sent to it. I'm not</p> <p>10 sure I understand. 02:40:37</p> <p>11 There's a scene that's been created. And</p> <p>12 this to me says that from -- the user can decide</p> <p>13 from the controller to select that scene -- and I'm</p> <p>14 paraphrasing -- and send these parameters that we</p> <p>15 talked about to the zone players in that scene. 02:40:53</p> <p>16 BY MR. PAK:</p> <p>17 Q Okay. So let's look -- let's relook at</p> <p>18 column 10, lines 12 to 15. It says:</p> <p>19 "In the example of Figure 1, the</p> <p>20 scene is saved in one of the zone 02:41:08</p> <p>21 players and displayed on controller</p> <p>22 142. In operation, a set of data</p> <p>23 pertaining to the scene includes a</p> <p>24 plurality of parameters."</p> <p>25 Do you see that? 02:41:18</p> <p style="text-align: right;">Page 190</p>	<p>1 repeat that.</p> <p>2 So when you save a song on a computing</p> <p>3 device, you're saving a file that represents a song</p> <p>4 in the computing device, correct?</p> <p>5 A No, I don't agree with that. 02:43:17</p> <p>6 What is a song? That's an abstract -- the</p> <p>7 song is the file. So it's not a representation.</p> <p>8 It's the song. That is the file that you're saving.</p> <p>9 Q So when someone says -- so when a user</p> <p>10 decides to save a song, what happens under the hood, 02:43:40</p> <p>11 like, how does the computing device save a song?</p> <p>12 A The song --</p> <p>13 MR. KAPLAN: Object to the form.</p> <p>14 THE WITNESS: Assuming the song is in digital</p> <p>15 form, the computing device saves the song file which 02:44:02</p> <p>16 contains a sequence of bits that, when played back,</p> <p>17 are the song.</p> <p>18 BY MR. PAK:</p> <p>19 Q Yeah, so let me ask you it this way then.</p> <p>20 When a user tries to save a song from a 02:44:27</p> <p>21 computer from an Ethernet interface, right, if --</p> <p>22 the user inputs a command to save the song, right?</p> <p>23 A Yes.</p> <p>24 Q And the computing device receives that</p> <p>25 command to save a song, correct? 02:44:57</p> <p style="text-align: right;">Page 192</p>
<p>1 A Yes.</p> <p>2 Q Now, when you save a zone scene in one of the</p> <p>3 zone players, you're really saving data pertaining</p> <p>4 to the zone scene in one of the zone players,</p> <p>5 correct? 02:41:29</p> <p>6 MR. KAPLAN: Object to form.</p> <p>7 THE WITNESS: I don't know. I don't know</p> <p>8 what they're saving.</p> <p>9 BY MR. PAK:</p> <p>10 Q Well, the zone player has to save some form 02:41:44</p> <p>11 of data that represents the zone scene, right, if</p> <p>12 it's going to save a zone scene?</p> <p>13 MR. KAPLAN: Object to form.</p> <p>14 THE WITNESS: I guess what I'm trying to</p> <p>15 figure out there is, isn't the zone scene the data 02:42:07</p> <p>16 itself?</p> <p>17 BY MR. PAK:</p> <p>18 Q Well, let me ask -- let me ask you this way.</p> <p>19 When you want to save a song on your</p> <p>20 computer, some form of data is saved on that 02:42:27</p> <p>21 computer, right, that represents the song?</p> <p>22 A Well, it's the audio file that is the song.</p> <p>23 Q Right. So when you -- when you save a song</p> <p>24 on a computer, you're saving a -- you're saving a</p> <p>25 file that represents a song and -- let me just 02:42:49</p> <p style="text-align: right;">Page 191</p>	<p>1 A Yes.</p> <p>2 Q How does the computing device or, you know --</p> <p>3 starting over here.</p> <p>4 What action does the computing device do to</p> <p>5 actually save a song in the computing device? 02:45:14</p> <p>6 MR. KAPLAN: Object to form.</p> <p>7 THE WITNESS: Assuming the saving location</p> <p>8 has -- the saving location has been determined,</p> <p>9 which is the intermediate step, the computing device</p> <p>10 will start at the first bit and start writing it to 02:45:31</p> <p>11 that location until it's finished. In memory or on</p> <p>12 the hard drive somewhere.</p> <p>13 BY MR. PAK:</p> <p>14 Q So the computing device saves a song in the</p> <p>15 hard drive or memory, you know, in the form of a 02:45:57</p> <p>16 file, right?</p> <p>17 A I don't know -- the song is a file. It</p> <p>18 sounds like you're saying the song is something else</p> <p>19 and then it gets converted to a file, and that's</p> <p>20 just not the case. 02:46:17</p> <p>21 The song is the file. Without that, there's</p> <p>22 no song.</p> <p>23 Q Well, let me ask you this way.</p> <p>24 From a user perspective, right, a user would</p> <p>25 say that he or she plays a song, right? He or she 02:46:59</p> <p style="text-align: right;">Page 193</p>

<p>1 wouldn't say that he or she plays a file, right, or 2 plays data?</p> <p>3 A Well, that's the vernacular as opposed to the 4 actual technical. I could point you to a number of 5 users in my department that would say they're 02:47:27 6 playing a data file.</p> <p>7 So, I mean, I don't think that's -- I mean, 8 maybe a user would say that, but it doesn't make it 9 technically correct.</p> <p>10 Q All right. Let's talk about this in the 02:47:49 11 context of Microsoft Word then.</p> <p>12 When you save a Microsoft Word document, 13 right, what format does your computing device save a 14 Microsoft Word document?</p> <p>15 A It is again a sequence of bits that -- the 02:48:13 16 format is not open to us. It's a Microsoft internal 17 format. So I couldn't tell you what the file looks 18 like. You can only reopen it by using their user 19 interface.</p> <p>20 Q When you save a Microsoft Word document, 02:48:39 21 you're saving some form of data, right?</p> <p>22 A I mean, that's -- everything on your computer 23 is data, so yes.</p> <p>24 Q And that data that is saved represents the 25 Microsoft Word document, right? 02:49:12</p> <p style="text-align: right;">Page 194</p>	<p>1 Q Okay. And during the break I uploaded the 2 '033 patent and marked it as Exhibit 14. 3 (Exhibit 14 was marked for identification 4 electronically and is attached hereto.)</p> <p>5 BY MR. PAK: 03:03:09</p> <p>6 Q Do you see that?</p> <p>7 A Just checking here.</p> <p>8 Yes.</p> <p>9 Q And you looked at the '033 patent, correct?</p> <p>10 A Yes, I did. 03:03:26</p> <p>11 Q I want to take a look at Claim 1 on PDF 12 page 28.</p> <p>13 Could you please read the transmitting an 14 instruction limitation that you mentioned in 15 paragraph 74 of your declaration. 03:03:50</p> <p>16 A I'm still scrolling.</p> <p>17 Q It's the second to the last page.</p> <p>18 A Yes. You want me to read the part that has 19 the transmitting the instruction?</p> <p>20 Q Yeah. How about -- how about you read the 03:04:13 21 transmitting an instruction limitation, you know, 22 all the way -- all the way before the "wherein" 23 clause.</p> <p>24 A Okay. So line 53?</p> <p>25 Q Yeah, correct.</p> <p style="text-align: right;">Page 196</p>
<p>1 A I think it's the same thing. As I said 2 before, it doesn't represent it, it is the Microsoft 3 Word document. It's not like you have another 4 representation. It's the -- it's the only one, and 5 it is the document. 02:49:30</p> <p>6 MR. PAK: Why don't we take a break now. I 7 think we've been going on for a while. I don't have 8 a whole lot left here. I know it's Friday. I don't 9 want to keep you here too long.</p> <p>10 THE VIDEOGRAPHER: Off the record at 02:50:06 11 2:50 p.m. 12 (Recess.)</p> <p>13 THE VIDEOGRAPHER: We are on record at 14 3:02 p.m.</p> <p>15 BY MR. PAK: 03:02:27</p> <p>16 Q I want to take a look at paragraph 74 of your 17 declaration.</p> <p>18 A Yes.</p> <p>19 Q Would you please read the first sentence.</p> <p>20 A 03:02:48</p> <p>21 "Claims 1 and 12 of the '033 22 patent recite transmitting an 23 instruction, and Claims 2 and 3 recite 24 wherein the instruction comprises an 25 instruction." 03:02:56</p> <p style="text-align: right;">Page 195</p>	<p>1 A 2 "Based on receiving the user 3 input, transmitting an instruction for 4 at least one given playback device to 5 take over responsibility for playback 03:04:35 6 of the remote playback queue from the 7 computing device."</p> <p>8 Q Okay. Let's take a look at Claim 2, 9 column 18. Could you please read Claim 2.</p> <p>10 A 03:04:47</p> <p>11 "The computing device of Claim 1 12 wherein the instruction comprises an 13 instruction for the cloud-based 14 computing system associated with the 15 media" -- 03:04:58</p> <p>16 Sorry. Let me start over.</p> <p>17 "The computing device of Claim 1, 18 wherein the instruction comprises an 19 instruction for the cloud-based 20 computing system associated with the 03:05:10 21 media service to provide the data 22 identifying the next one or more" -- 23 "the next one or more media items to 24 the given playback device for use in 25 retrieving at least one media item 03:05:22</p> <p style="text-align: right;">Page 197</p>

<p>1 from the cloud-based computing system</p> <p>2 associated with the cloud-based media</p> <p>3 service."</p> <p>4 Q That's a pretty long claim, right?</p> <p>5 So the instruction recited in Claim 2 is 03:05:38</p> <p>6 referring to the instruction for at least one given</p> <p>7 playback device to take over responsibility for</p> <p>8 playback of the remote playback queue from the</p> <p>9 computing device recited in Claim 1, correct?</p> <p>10 A Yes. 03:06:14</p> <p>11 Q In other words, the instruction recited in</p> <p>12 Claim 2 is not referring to the program instructions</p> <p>13 stored on the non-transitory computer readable media</p> <p>14 as recited in Claim 1, correct?</p> <p>15 MR. KAPLAN: Object to form. 03:06:43</p> <p>16 THE WITNESS: I guess it's not clear what is</p> <p>17 the difference between the program instructions.</p> <p>18 Aren't they all instructions? I'm trying to</p> <p>19 understand the reference here.</p> <p>20 BY MR. PAK: 03:07:12</p> <p>21 Q Does the instruction recited in Claim 2 refer</p> <p>22 to an instruction for the at least one given</p> <p>23 playback device to take responsibility for playback</p> <p>24 on the remote playback queue from the computing</p> <p>25 device in Claim 1, or does it refer to the program 03:07:35</p> <p>Page 198</p>	<p>1 So in that sentence, you understand that</p> <p>2 wherein -- the term "wherein the instruction"</p> <p>3 recited in Claim 2 refers to transmitting an</p> <p>4 instruction term in Claim 1, right?</p> <p>5 A Yes. I agree with that. 03:09:31</p> <p>6 Q Okay. So the instruction recited in Claim 2</p> <p>7 is not referring to program instructions recited in</p> <p>8 Claim 1, correct?</p> <p>9 MR. KAPLAN: Object to form.</p> <p>10 THE WITNESS: I guess that's what I was 03:09:45</p> <p>11 trying to say before. It's referring to the -- to</p> <p>12 the instruction that we read in that clause of the</p> <p>13 claim. But it's still a program instruction.</p> <p>14 That's all I was trying to say.</p> <p>15 MR. PAK: Okay. I have no further questions. 03:10:02</p> <p>16 I appreciate your time, Dr. K.</p> <p>17 Thanks for your time as well, Marc.</p> <p>18 MR. KAPLAN: Sure. I'm just thinking for a</p> <p>19 moment.</p> <p>20 We'll reserve signature. And no questions 03:10:18</p> <p>21 for me.</p> <p>22 THE VIDEOGRAPHER: We are off the record at</p> <p>23 3:10 p.m. This concludes today's testimony given by</p> <p>24 Dr. Chris Kyriakakis. Total media used was five and</p> <p>25 will be retained by Veritext Legal Solutions. 03:10:38</p> <p>Page 200</p>
<p>1 instructions recited in Claim 1?</p> <p>2 A Well, that's the thing. They're all program</p> <p>3 instructions, right? So this instruction,</p> <p>4 whichever -- whatever it's referring to, is a</p> <p>5 program instruction, right? So I don't see the 03:07:56</p> <p>6 difference necessarily.</p> <p>7 Q Well, Claim 1 recites an instruction for</p> <p>8 the at least one given playback device to take over</p> <p>9 responsibility for playback of the remote playback</p> <p>10 queue from the computing device, right? 03:08:16</p> <p>11 A Right. But at the beginning of Claim 2 is</p> <p>12 program instructions, when executed by at least one</p> <p>13 processor, cause the computing device to perform</p> <p>14 functions comprising -- and then a whole bunch of</p> <p>15 functions -- and then this instruction clause. So 03:08:35</p> <p>16 it's --</p> <p>17 Q Well, let's look at paragraph 74 again in</p> <p>18 your declaration.</p> <p>19 A Yes.</p> <p>20 Q And you say that "Claim 1" -- I'm sorry: 03:08:49</p> <p>21 "Claims 1 and 12 of the '033</p> <p>22 patent recite transmitting an</p> <p>23 instruction, and Claims 2 and 13</p> <p>24 recite wherein the instruction</p> <p>25 comprises an instruction." 03:09:04</p> <p>Page 199</p>	<p>1</p> <p>2 I, CHRISTOS KYRIAKAKIS, do hereby declare</p> <p>3 under penalty of perjury that I have read the</p> <p>4 foregoing transcript; that I have made any</p> <p>5 corrections as appear noted, in ink, initialed by</p> <p>6 me, or attached hereto; that my testimony as</p> <p>7 contained herein, as corrected, is true and correct.</p> <p>8 EXECUTED this ____ day of _____,</p> <p>9 20____, at _____, _____.</p> <p>(City) (State)</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>CHRISTOS KYRIAKAKIS</p> <p>Page 201</p>

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I, the undersigned, a Certified Shorthand Reporter of the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were placed under oath; that a record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS WHEREOF, I have this date subscribed my name.

Dated: June 14, 2021


KATHLEEN E. BARNEY
CSR No. 5698

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[university - we've]

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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Appendix L



CS519: Computer Networks

Lecture 1: Jan 24, 2004

Intro to Computer Networking

Exhibit
0002



Lets start at the beginning...

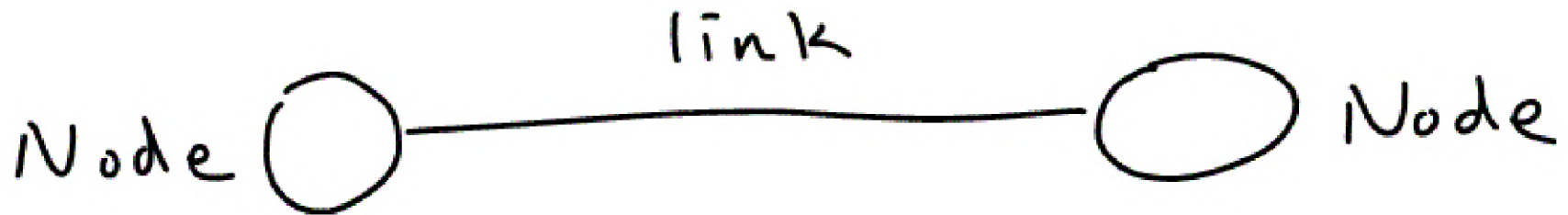
CS419

- What is a network for?
 - To allow two or more endpoints to communicate
- What is a network?
 - Nodes connected by links

● ● ● | Lets start at the beginning...

CS419

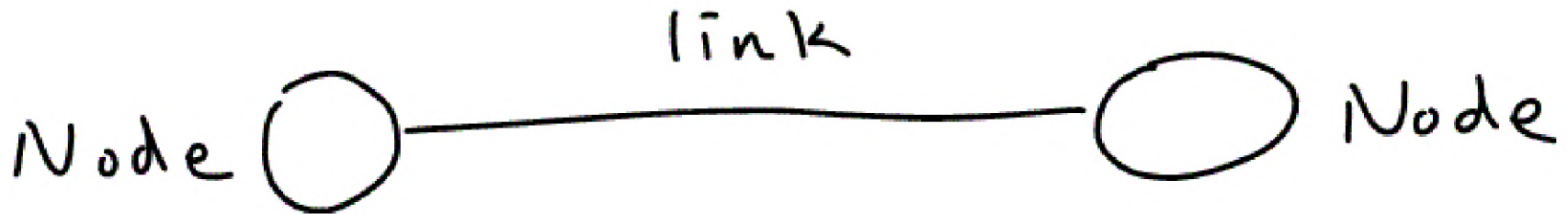
○ Is this a network?



Lets start at the beginning...

CS419

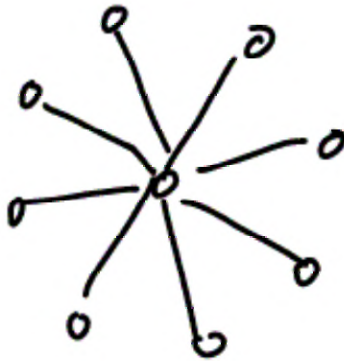
- Is this a network?



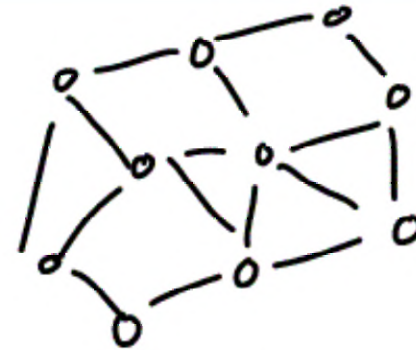
- Of course it is!
 - Just not very interesting

Other “networks” (network topologies)

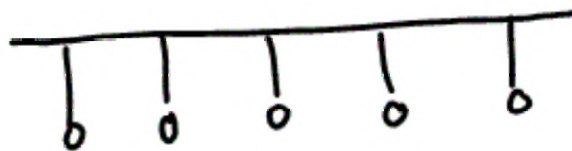
CS419



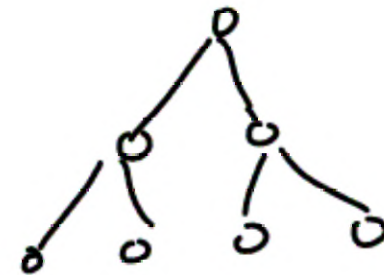
Star, or
Hub and spoke



Mesh



Broadcast



Hierarchical

What is a data network?

CS419

- The answer is NOT “a network that carries data”
 - Cause you can send “data” (e.g. a fax) over the “voice network”
- “Data network” is often a euphemism for “packet network”
 - And “voice network” is often a euphemism for “circuit network”



Packet network versus circuit network

CS419

- Historically, a circuit network was a network that literally established a physical wired connection between two points
 - With relays, plus amplifiers and stuff
- Before computers, this was the only way to do networks



Packet network versus circuit network

CS419

- But these days voice is modulated and digitized in numerous ways as it works through the network
 - Very few physical circuits
- So nowadays we consider a circuit network one that appears to establish a fixed “pipe” (amount of bandwidth) between two points



Types of circuits

CS419

- Synchronous time-division multiplexing (STDM)
 - Each circuit is given a slice of time
- Frequency-division multiplexing (FDM)
 - Each circuit is given a transmission frequency

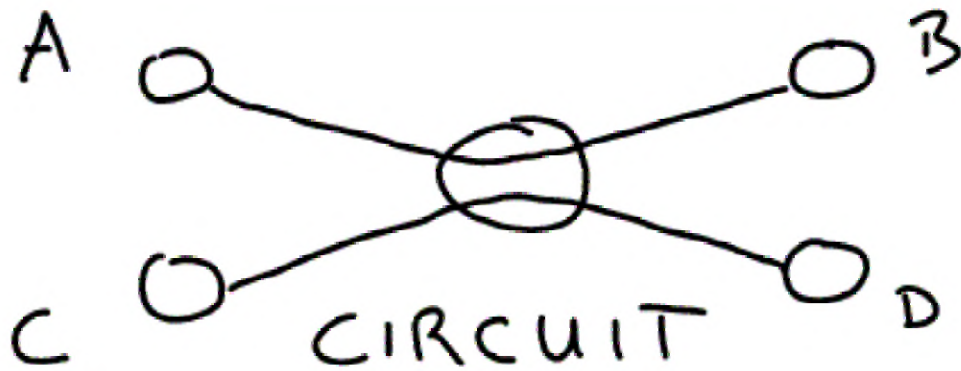


Packet network versus circuit network

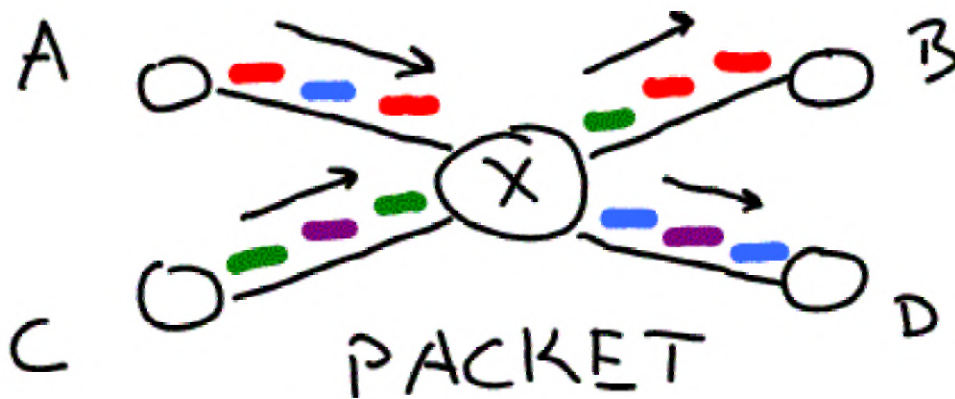
CS419

- By contrast, a packet network allows small units of data (packets) to be individually sent to different destinations

Packet network versus circuit network

CS419

C can't talk to B
while A is
talking to B



A and C can
both talk to
B and D



Packet network versus circuit network

CS419

- So clearly packet switched is better than circuit switched, right?



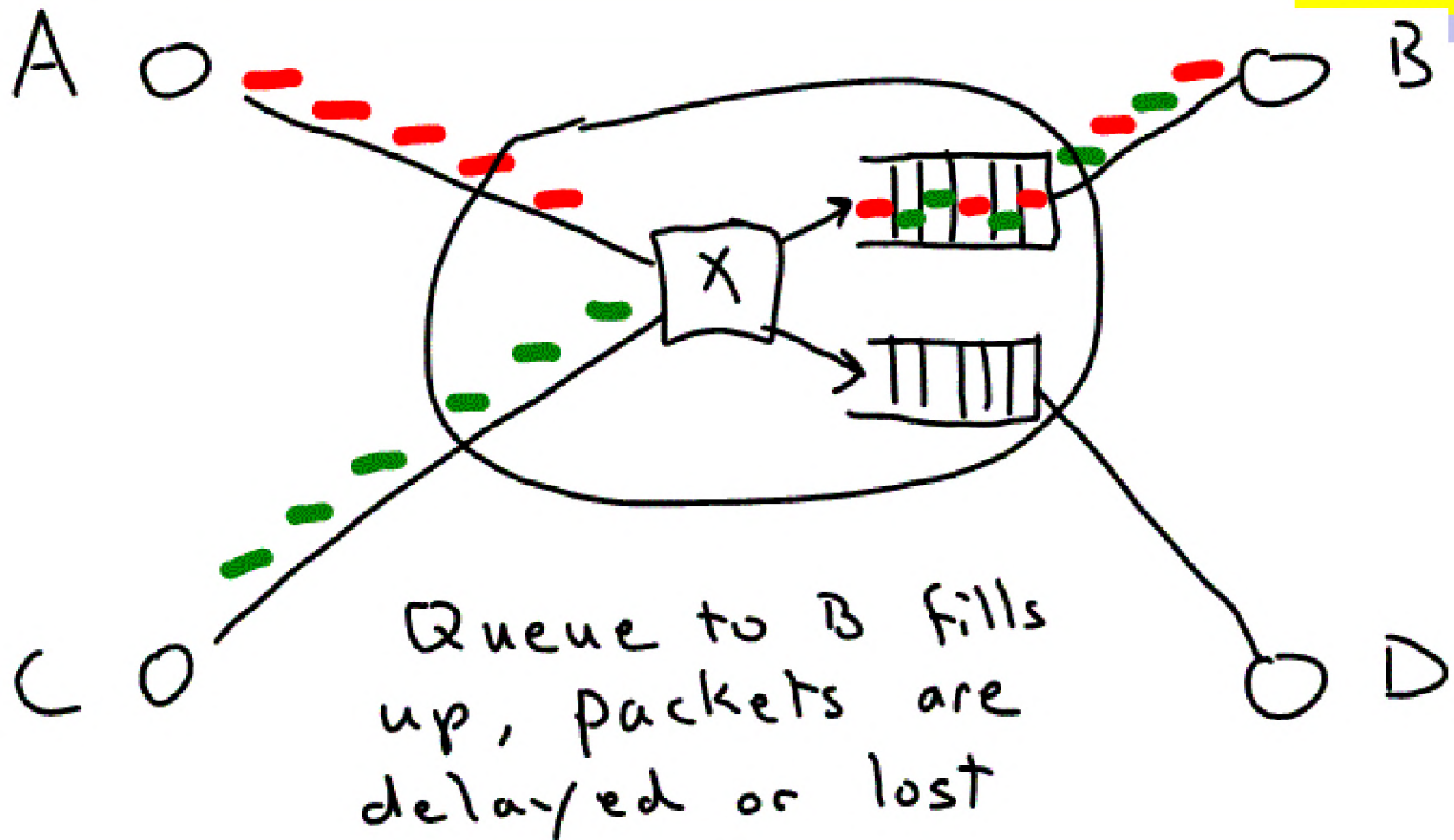
Packet network versus circuit network

CS419

- So clearly packet switched is better than circuit switched, right?
- Well, as with so much in this world, *it depends*
- What if A and C try to talk exclusively to B at high speed at the same time?

Delay and packet loss in packet networks

CS419



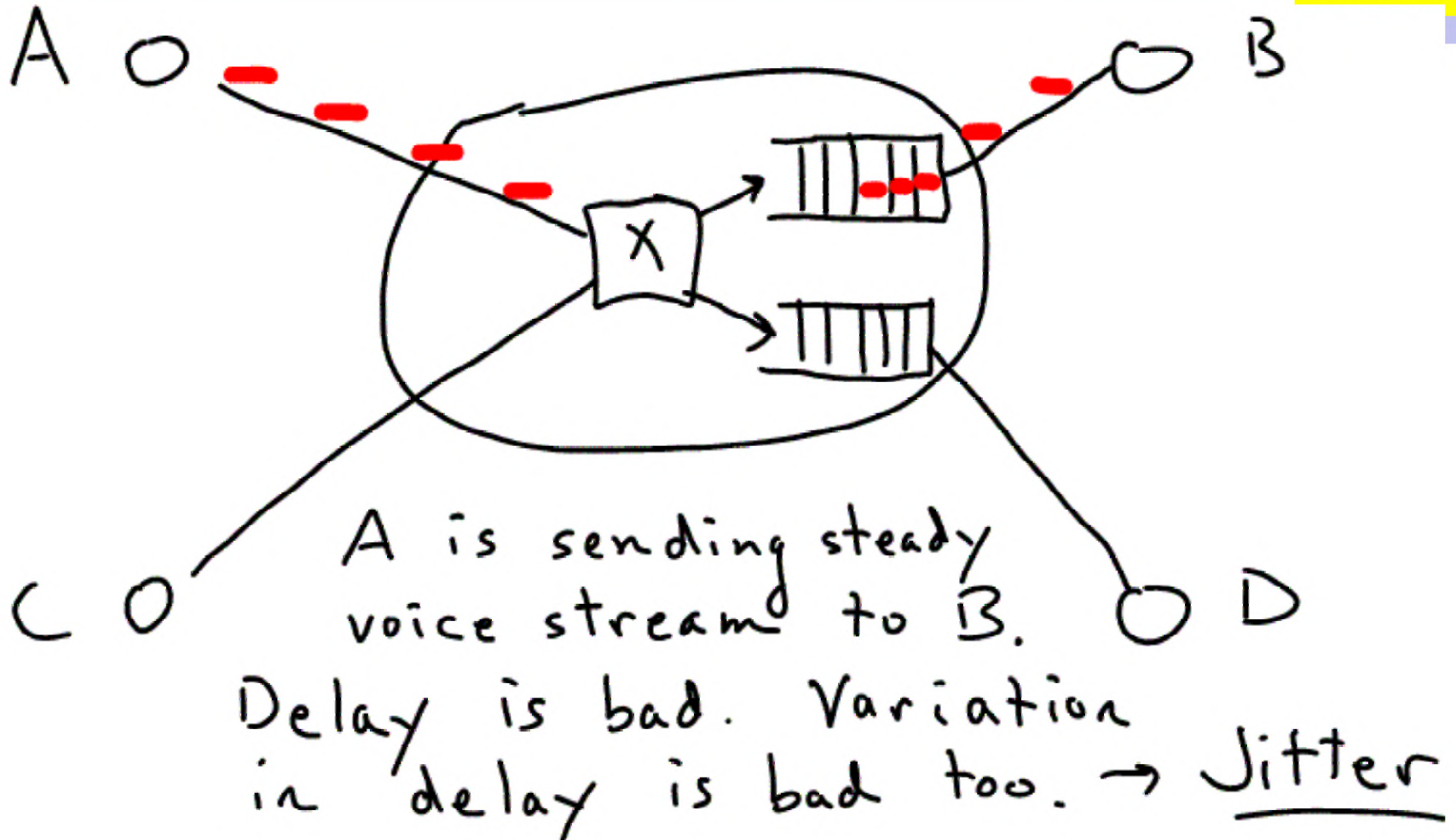


Delay and packet loss in packet networks

CS419

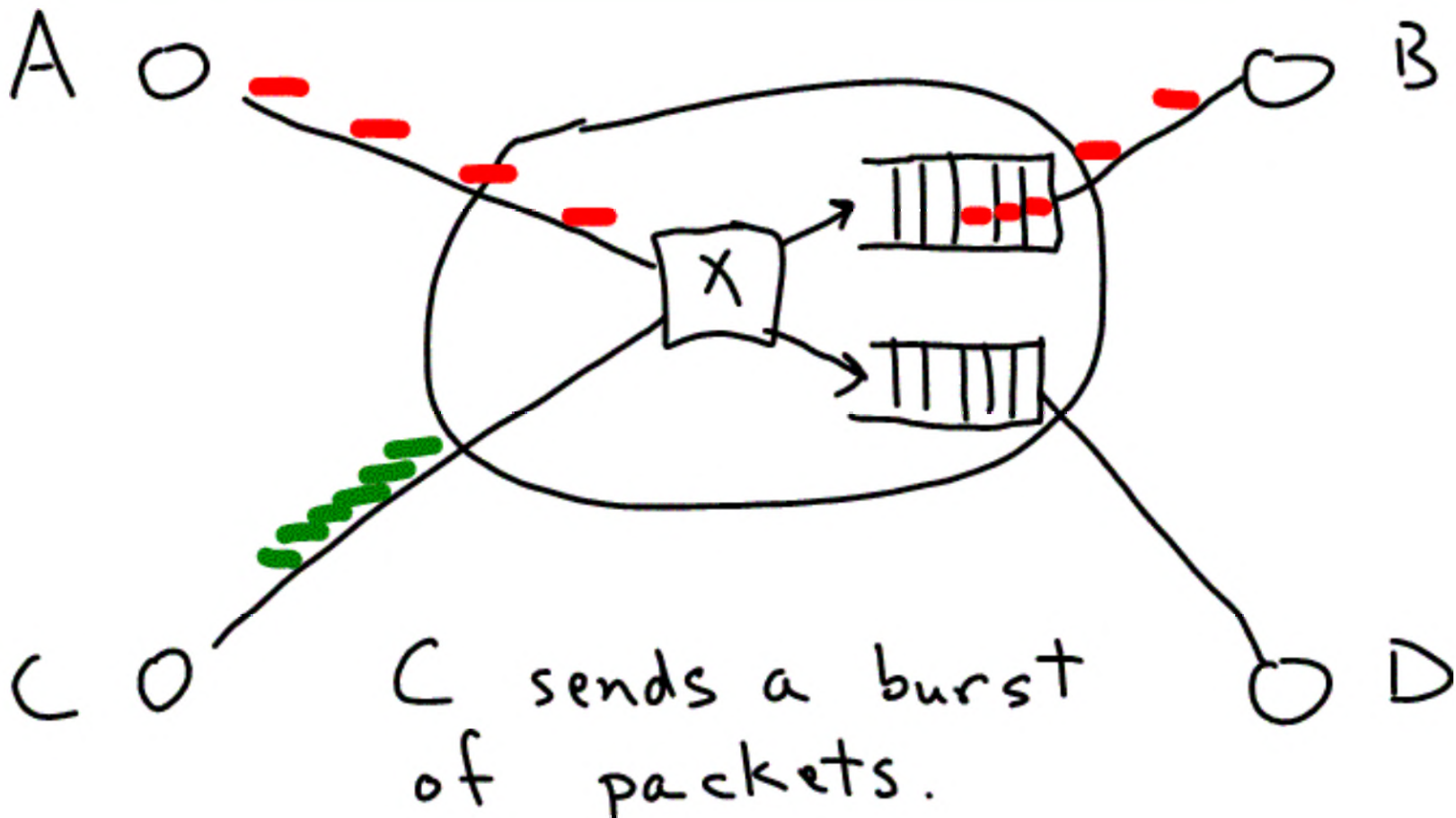
- Can happen any time multiple links feed into a single link
 - And incoming volume exceeds outgoing volume
- Larger queues can reduce packet loss at the expense of more delay
- Ultimately the sources have to slow down (congestion control)
- By contrast, circuit networks can block (busy tone)

Also Jitter

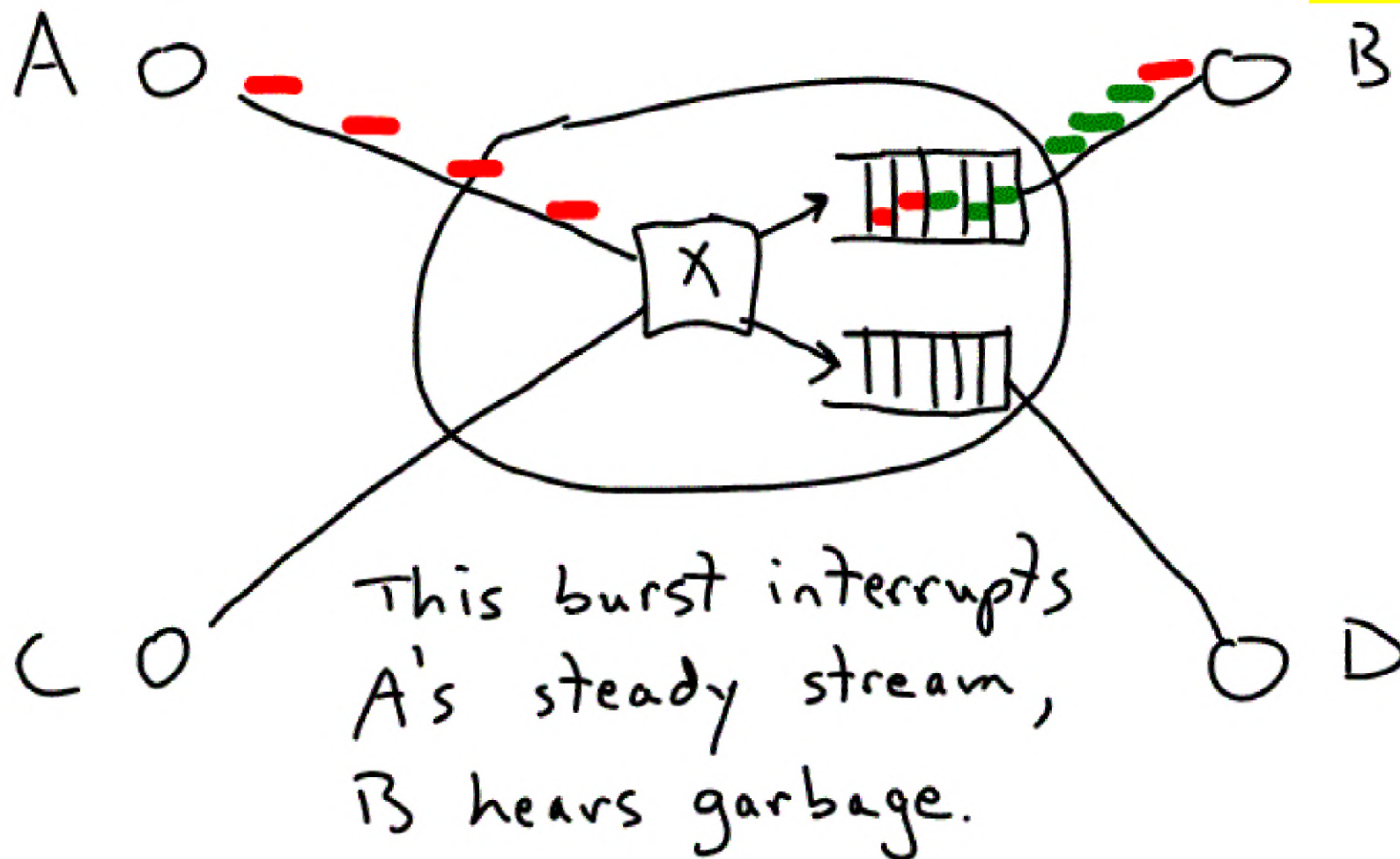
CS419

Also Jitter

CS419



Also Jitter

CS419



Circuits versus packets

CS419

- Circuits are an all or nothing proposition
 - Give good quality, if you can get yourself a circuit in the first place
 - Efficient only if the application keeps the circuit full (I.e. a voice stream)
- Packets are more flexible
 - Can send a little or a lot
 - But other traffic can interfere at any time
 - More efficient when traffic is bursty



Can a packet network emulate a circuit?

CS419

- After all, our STDM circuit sent data over the wire in “chunks”

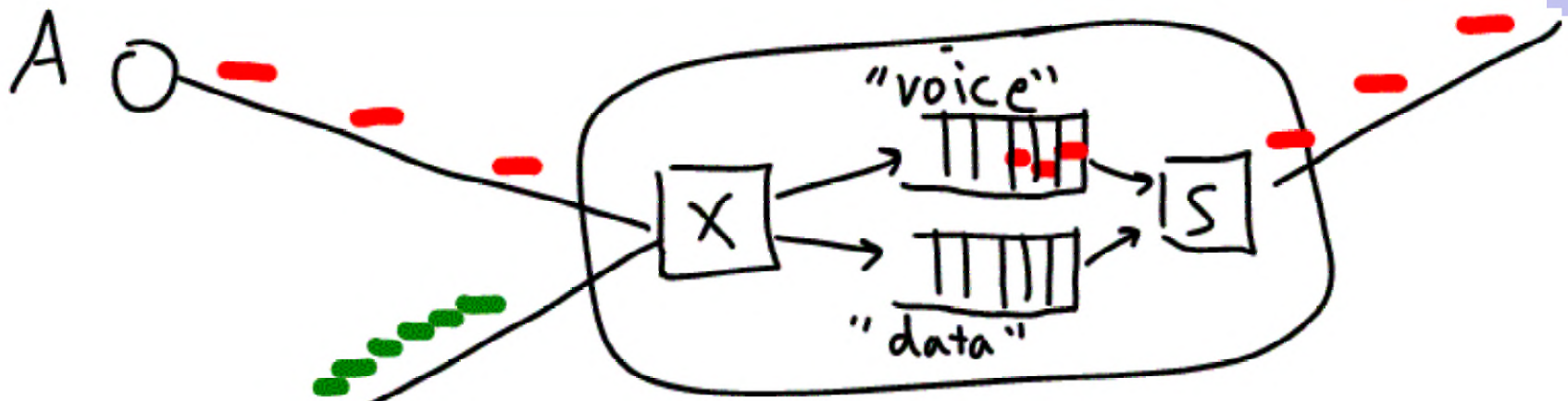


Can a packet network emulate a circuit?

CS419

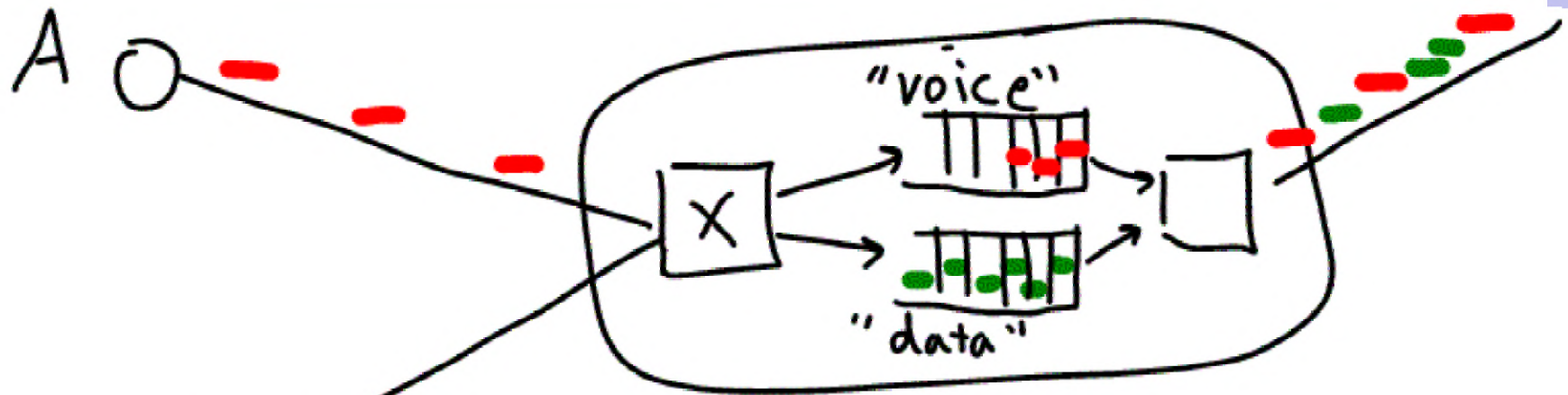
- After all, our STDM circuit sent data over the wire in “chunks”
- The answer is yes, it can
- And indeed, the first packet networks offered “services” that very much emulated circuits

One way to do it

CS419

Treat "voice" and "data"
packets differently, for
instance with different
queues and schedulers

One way to do it

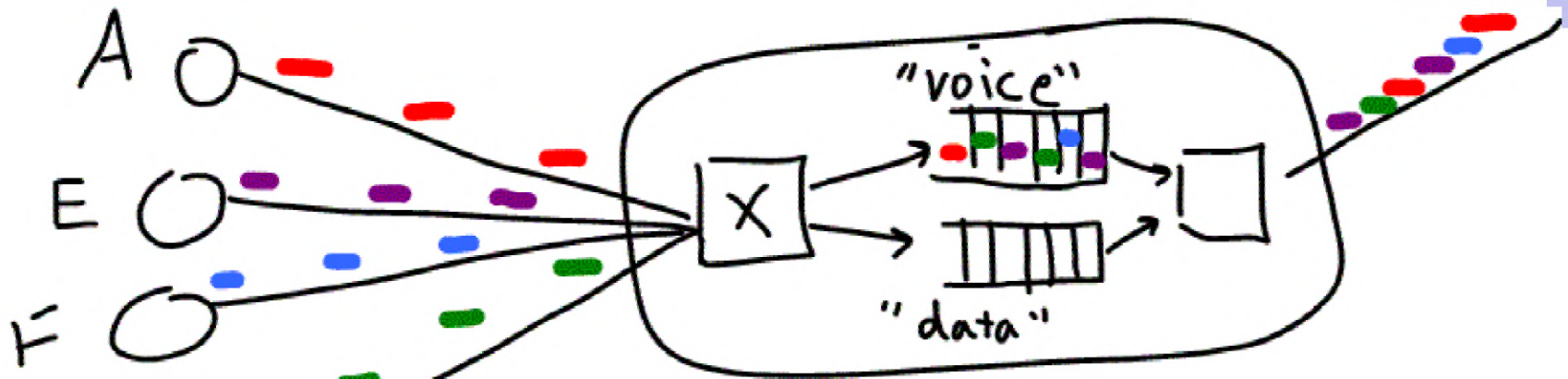
CS419

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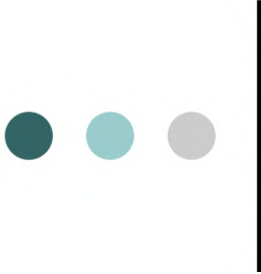
This way, a burst of data doesn't add jitter to the voice, but rather gets delayed itself

But this has complications too

CS419



Too many voice "flows"
can still overflow the
queue. Must be a way to
reserve queuing resources
("call setup")



“Datagram” versus “virtual circuit” networks

CS419

- Both are packet networks
 - (We won't discuss pure circuit networks any more in this course)
- Virtual circuit networks have the notion of call setup and blocking
 - But much more complex traffic models than our simple two-queue example
- Datagram networks is how the Internet ultimately got built!



But virtual circuit networks still important

CS419

- We don't see virtual circuit networks to our desktop
 - Though this was the vision for many folks
- But virtual circuit networks formed the unpinning of the Internet
 - Something called ATM
 - Being replaced with MPLS



This class focuses on the Internet

CS419

- Which is a datagram network
- One big topic will be how queues in the Internet manage not to become hopelessly overloaded
 - Many of you know, the answer is TCP, but we'll look at this in detail

Some terms introduced so far

CS419

- Network, node, link, queue
- Circuit and packet networks
 - a.k.a. data and voice networks
- Virtual circuit and datagram networks
- Delay, latency, loss, drop, jitter, blocking

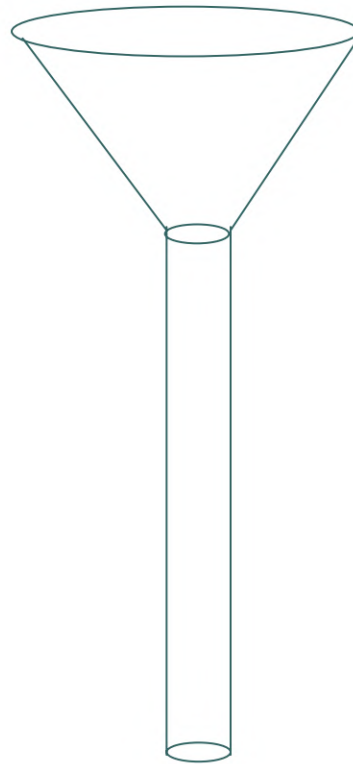
Bandwidth and Latency

CS419

- We looked at delay due to queuing
- But there are three main components to delay:
 - Propagation delay
 - Transmit delay
 - Queuing delay

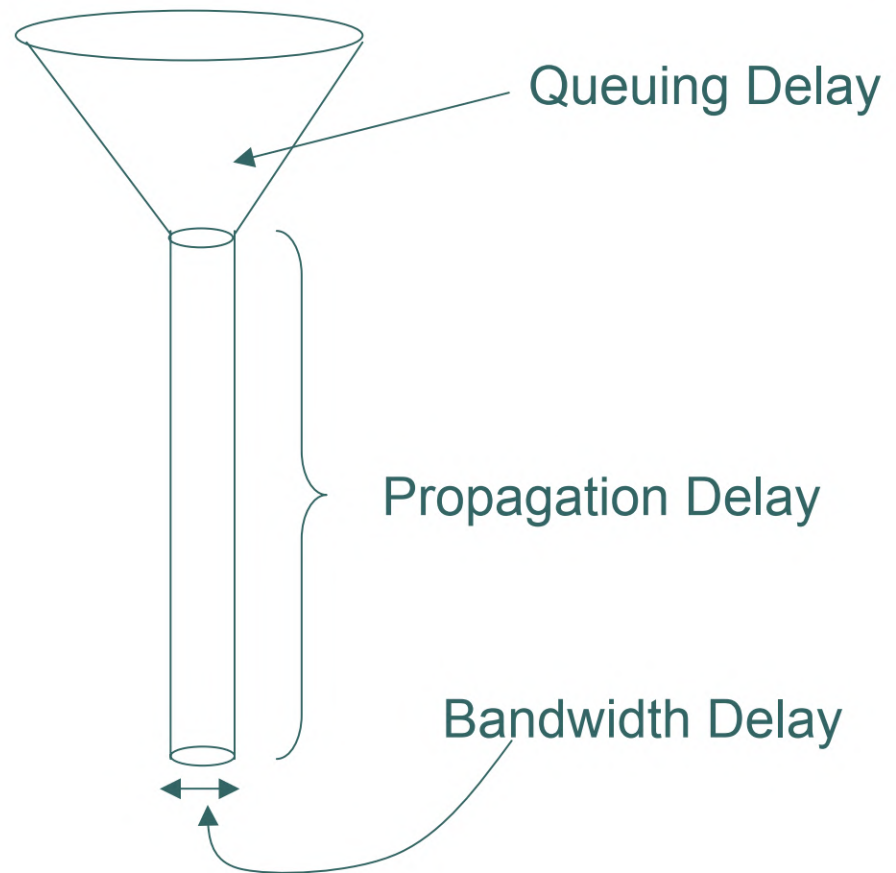
Queuing, transmit, and propagation delays

CS419



Queuing, transmit, and propagation delays

CS419



Total latency

CS419

- Total latency =
 - Propagation + Transmit + Queue
- Propagation =
 - Distance / Speed of light
- Transmit =
 - Packet size / Bandwidth

Delay x Bandwidth Product

CS419

- Refers to the number of bits you can have “in the pipe” at the same time
 - Or, how many bits you can stuff in the pipe before the first bit comes out the other end
 - Like hot water getting from the water heater to your shower!
- As bandwidth increases (and distance doesn't change) this is becoming an issue

An extreme (but realistic) Delay x Bandwidth Example

CS419

- Coast-to-coast propagation delay = 15ms
- OC192 link = 10 Gbps
- $10 \text{ Gbps} \times 15\text{ms} = 150,000,000 \text{ bits} = 19 \text{ Mbytes} = 7 \text{ songs (MP3 files)}$
- You could stuff 7 songs into an OC192 pipe at Boston before the first song starting arriving in LA!!!

A more common Delay x Bandwidth Example

CS419

- 50ms coast to coast delay (mainly from queuing)
- 100 Mbps Ethernet
- This is about 600Kbytes...still a decent sized file
- Delay x Bandwidth is starting to dominate our thinking about protocol performance



Common provider bandwidth units

CS419

- DSO = 64 Kbps
- DS1 = 1.544 Mbps
- DS3 = 44.736 Mbps
- OC3 = 155.52 Mbps
- OC12 = 622.08 Mbps
- OC48 = 2.488 Gbps
- OC192 = 9.953 Gbps
- OC768 = 39.813 Gbps

Bandwidth and throughput and goodput

CS419

- Bandwidth is the maximum theoretical speed of a pipe
- Throughput is the actual measured speed
 - Vague term because depends on where you measure
- Goodput is the throughput seen by the application
 - Throughput over the pipe can be more than goodput because of dropped and retransmitted packets, control packets, and headers

Appendix M



Microsoft

Computer Dictionary

Fifth Edition

- Fully updated with the latest technologies, terms, and acronyms
- Easy to read, expertly illustrated
- Definitive coverage of hardware, software, the Internet, and more!

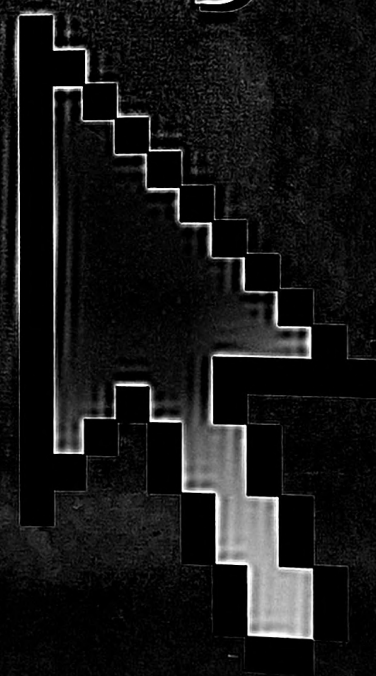


Exhibit
0003

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Acquisitions Editor: Alex Blanton

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Body Part No. X08-41929

data manipulation

data sharing

D the parts of the system work in harmony so that data is stored safely and accurately. Application programs manage data by receiving and processing input according to the user's commands, and sending results to an output device or to disk storage. The user also is responsible for data management by acquiring data, labeling and organizing disks, backing up data, archiving files, and removing unneeded material from the hard disk.

data manipulation *n.* The processing of data by means of programs that accept user commands, offer ways to handle data, and tell the hardware what to do with the data.

data manipulation language *n.* In database management systems, a language that is used to insert data in, update, and query a database. Data manipulation languages are often capable of performing mathematical and statistical calculations that facilitate generating reports. *Acronym:* DML. *See also* structured query language.

data mart *n.* A scaled-down version of a data warehouse that is tailored to contain only information likely to be used by the target group. *See also* data warehouse.

data medium *n.* The physical material on which computer data is stored.

data migration *n.* **1.** The process of moving data from one repository or source, such as a database, to another, usually via automated scripts or programs. Often data migration involves transferring data from one type of computer system to another. **2.** In supercomputing applications, the process of storing large amounts of data off line while making them appear to be on line as disk-resident files.

data mining *n.* The process of identifying commercially useful patterns, problems, or relationships in a database, a Web server, or other computer repository through the use of advanced statistical tools. Some Web sites use data mining to monitor the efficiency of site navigation and to determine changes in the Web site's design based on how consumers are using the site.

data model *n.* A collection of related object types, operators, and integrity rules that form the abstract entity supported by a database management system (DBMS). Thus, one speaks of a relational DBMS, a network DBMS, and so on, depending on the type of data model a DBMS supports. In general, a DBMS supports only one data model as a practical rather than a theoretical restriction.

data network *n.* A network designed for transferring data encoded as digital signals, as opposed to a voice network, which transmits analog signals.

Data Over Cable Service Interface Specification *n.* *See* DOCSIS.

data-overflow error *n.* An error that occurs when more data is being acquired than can be processed. *See also* bps.

data packet *n.* *See* packet.

data path *n.* The route that a signal follows as it travels through a computer network.

data point *n.* Any pair of numeric values plotted on a chart.

data processing *n.* **1.** The general work performed by computers. **2.** More specifically, the manipulation of data to transform it into some desired result. *Acronym:* DP. *Also called:* ADP, automatic data processing, EDP, electronic data processing. *See also* centralized processing, decentralized processing, distributed processing.

Data Processing Management Association *n.* *See* DPMA.

data projector *n.* A device, similar to a slide projector, that projects the video monitor output of a computer onto a screen.

data protection *n.* The process of ensuring the preservation, integrity, and reliability of data. *See also* data integrity.

data rate *n.* The speed at which a circuit or communications line can transfer information, usually measured in bits per second (bps).

data record *n.* *See* record¹.

data reduction *n.* The process of converting raw data to a more useful form by scaling, smoothing, ordering, or other editing procedures.

data segment *n.* The portion of memory or auxiliary storage that contains the data used by a program.

Data Service Unit *n.* *See* DDS.

data set *n.* **1.** A collection of related information made up of separate elements that can be treated as a unit in data handling. **2.** In communications, a modem. *See also* modem.

Data Set Ready *n.* *See* DSR.

data sharing *n.* The use of a single file by more than one person or computer. Data sharing can be done by physically transferring a file from one computer to another, or, more commonly, by networking and computer-to-computer communications.

Appendix N

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Robert A. Lambourne
Title: Controlling and manipulating groupings in a multi-zone music or media system
Serial No.: 60/825,407
Filing Date: 09/12/2006
Assignee:
Examiner: Unknown
Group Art Unit: Unknown
Docket No.: RIN-022P

October 4, 2006

Box Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

Response to Notice to File Missing Parts of Application
Filing Date Granted

Dear Sir:

A Notice to File Missing Parts of Provisional Application was received. The Notice alleges that a cover sheet under 37 CFR1.51 (c)(1) is missing. However, the Applicant believes that such a cover sheet is enclosed at the time of filing the above-referenced application. The Applicant enclosed herewith a copy of the originally filed cover sheet.

37 CFR1.51 (c)(1) states

(1) A cover sheet identifying:

- (i) The application as a provisional application (see line 4)
- (ii) The name or names of the inventor or
inventors, (see § 1.41(a)(2)), (see line 13)
- (iii) The residence of each named inventor, (see lines 15-16)
- (iv) The title of the invention, (see lines 9-10)
- (v) The name and registration number of

the attorney or agent (if applicable), *(the e-filing has generated the information)*

(vi) The docket number used by the person
filing the application to identify the application (if
applicable), *(see line 21)*

(vii) The correspondence address, and *(the e-filing has generated the information)*

(viii) The name of the U.S. Government
agency and Government contract number (if the
invention was made by an agency of the U.S. Government
or under a contract with an agency of the U.S.
Government); *(Not applicable)*

It is hereby respectfully submitted that the provisional application filed on
09/12/2006 is complete and justifies the US filing date of 09/12/2006.

Please telephone the undersigned at (408)777-8873, if there are any
questions.

I hereby certify that this correspondence is
being deposited with the United States Postal
Service as first class mail in an envelope
addressed to "Commissioner of Patents and
Trademarks, Washington, DC 20231", on
October 4, 2006.
e-filed

Respectfully submitted;

/ joe zheng /
Joe Zheng
Reg.: No. 39,450

Signature: / joe zheng /
Joe Zheng



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
60/825,407	09/12/2006	Robert A. Lambourne	RIN-022P

26797
SILICON VALLEY PATENT AGENCY
7394 WILDFLOWER WAY
CUPERTINO, CA 95014

CONFIRMATION NO. 1970
FORMALITIES
LETTER

Date Mailed: 09/26/2006

NOTICE TO FILE MISSING PARTS OF PROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(c)

Filing Date Granted

An application number and filing date have been accorded to this provisional application. The items indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The provisional application cover sheet under 37 CFR 1.51(c)(1), which may be an application data sheet (37 CFR 1.76), is required identifying either city and state or city and foreign country of the residence of each inventor and the name(s) of the inventor(s).

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee or cover sheet) as set forth in 37 CFR 1.16(g) of \$25 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this letter.

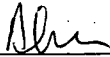
SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is \$25 for a small entity

- \$25 Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
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Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199, or 1-800-972-6382
PART 3 - OFFICE COPY

In the United States Patent and Trademark Office

Provisional Application

for

Controlling and manipulating groupings in a multi-zone music or media system

Inventor: Robert A. Lambourne
2970 Arriba Way
Santa Barbara, CA 93105
Citizenship: United Kingdom

File No.: RIN-022P

Express Mail Label: **e-filed** Date of Deposit: **September 12, 2006**
I hereby certify that this paper or fee is being deposited with the United States Postal
Service using "Express Mail Post Office To Addressee" service under 37 CFR 1.10 on
the date indicated above and is addressed to "Mail Stop: New Application, Commissioner
for Patents, P.O. Box 1450, Alexandria, VA 22313"

Signed: / joe zheng /
Joe Zheng

Electronic Acknowledgement Receipt

EFS ID:	1236677
Application Number:	60825407
Confirmation Number:	1970
Title of Invention:	Controlling and manipulating groupings in a multi-zone music or media system
First Named Inventor:	Robert A. Lambourne
Customer Number:	26797
Filer:	Joe Zheng
Filer Authorized By:	
Attorney Docket Number:	RIN-022P
Receipt Date:	05-OCT-2006
Filing Date:	12-SEP-2006
Time Stamp:	00:34:35
Application Type:	Provisional
International Application Number:	

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Applicant Response to Pre-Exam Formalities Notice	ResponseToMissingParts.pdf	156829	no	5

Warnings:**Information:****Total Files Size (in bytes):**

156829

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.



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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
60/825,407	09/12/2006	Robert A. Lambourne	RIN-022P

26797
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CONFIRMATION NO. 1970
FORMALITIES
LETTER

Date Mailed: 09/26/2006

NOTICE TO FILE MISSING PARTS OF PROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(c)

Filing Date Granted

An application number and filing date have been accorded to this provisional application. The items indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The provisional application cover sheet under 37 CFR 1.51(c)(1), which may be an application data sheet (37 CFR 1.76), is required identifying either city and state or city and foreign country of the residence of each inventor and the name(s) of the inventor(s).

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee or cover sheet) as set forth in 37 CFR 1.16(g) of \$25 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this letter.

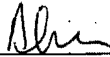
SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is \$25 for a small entity

- \$25 Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
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 Alexandria VA 22313-1450

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PART 3 - OFFICE COPY

In the United States Patent and Trademark Office

Provisional Application

for

Controlling and manipulating groupings in a multi-zone music or media system

Inventor: Robert A. Lambourne
2970 Arriba Way
Santa Barbara, CA 93105
Citizenship: United Kingdom

File No.: RIN-022P

Express Mail Label: **e-filed** Date of Deposit: **September 12, 2006**
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Service using "Express Mail Post Office To Addressee" service under 37 CFR 1.10 on
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for Patents, P.O. Box 1450, Alexandria, VA 22313"

Signed: / joe zheng /
Joe Zheng

Controlling and manipulating groupings in a multi-zone music or media system

5

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to the area of consumer electronics, and more particularly, relates to techniques for controlling and
10 manipulating groupings in a multi-zone music or media system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention, also in Appendix A and B, is presented largely in terms of procedures in terms of procedures, steps,
15 logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set
20 forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring
25 aspects of the present invention.

Reference herein to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase “in one
5 embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular
10 order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. 1 shows an exemplary configuration **100** in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential
15 home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples **102**, **104** and **106** are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

20 As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration **100** represents a home. Thus, the zone player **102** and **104** may be located in two of the bedrooms
25 respectively while the zone player **106** may be installed in a living room. All of the zone players **102**, **104** and **106** are coupled directly or indirectly

to a data network **108**. In addition, a computing device **110** is shown to be coupled on the network **108**. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network **108** as well.

5 The network **108** may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players **102**, **104** and **106** are coupled to the network **108** by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players **102**, **104** and **106**
10 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded
15 sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk).
20 The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone
25 group may be grouped together. In one instance, a new zone group is

formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a digital signal processing module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. 1) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the

interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player

5 **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks.

According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in

10 reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files

15 that may be retrieved for modification at any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or

20 control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio

25 source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio

signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices
5 on a network.

Depending on an exact implementation, the digital signal processing module **212** may be implemented within the audio processing circuit **210** or as a combination of hardware and software. The audio amplifier **214** is typically an analog circuit that powers the provided analog
10 audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an example of a controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multimedia applications, automation and others in a complex. In particular, the
15 controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g.,
20 infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one
25 zone players by grouping the zone players in a group. In another

embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a “zones” button **244**, a “back” button **246**, a “music” button **248**, a scroll wheel **250**,
5 “ok” button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user’s selection. In one embodiment, the “zones” button **244** activates a
10 zone management screen or “Zone Menu”, which is described in more details below. The “back” button **246** may lead to different actions depending on the current screen. In one embodiment, the “back” button triggers the current screen display to go back to a previous one. In
15 another embodiment, the “back” button negates the user’s erroneous selection. The “music” button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player’s music queue for playback.

The scroll wheel **250** is used for selecting an item within a list,
20 whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The
25 “ok” button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track.

5 According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio

10 sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an

15 exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be

20 executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application

25 module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276**

executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as
5 a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller
10 via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least
15 two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone players can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a
20 timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the “zones” button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A “Zone Menu” is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for ‘joining’ zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

- Bathroom
- Bedroom

- Den
- Dining Room
- Family Room
- Foyer

5 If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite consuming.

10 According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to as a zone scene or scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes in for the grouping are determined.

15 For instance, a “Morning” zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3 provides an illustration of one zone scene, where the left column shows the starting zone grouping – all zones are separate, the column on the right shows the effects of grouping the
20 zones to make a group of 3 zones.

 Expanding this idea further, the Zone Scene can be set to create multiple sets of linked zones. For example the “Morning Mode” scene would create 3 separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own

group, and the outside zones (in this case the patio) would move into a group of its own.

Optionally, a system may be supplied with a command that links all zones in one step. This may be a simple form of a zone scene. In one embodiment that extends to more than just linking zones together. After linking the appropriate zones, a zone scene command could apply the following attributes:

1. Set volumes levels in each zones (each zone can have a different volume)
2. Mute/Unmute zones.
3. Select and play specific music in the zones.
4. Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)
5. Set the music playback equalization of each zone (bass treble) etc.

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone Scene is set to apply at 8:00am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration.

Annexed hereto is an Appendix A providing examples to teach and refer to various features, detailed designs, uses, advantages, configurations and characteristics in one embodiment of the present invention.

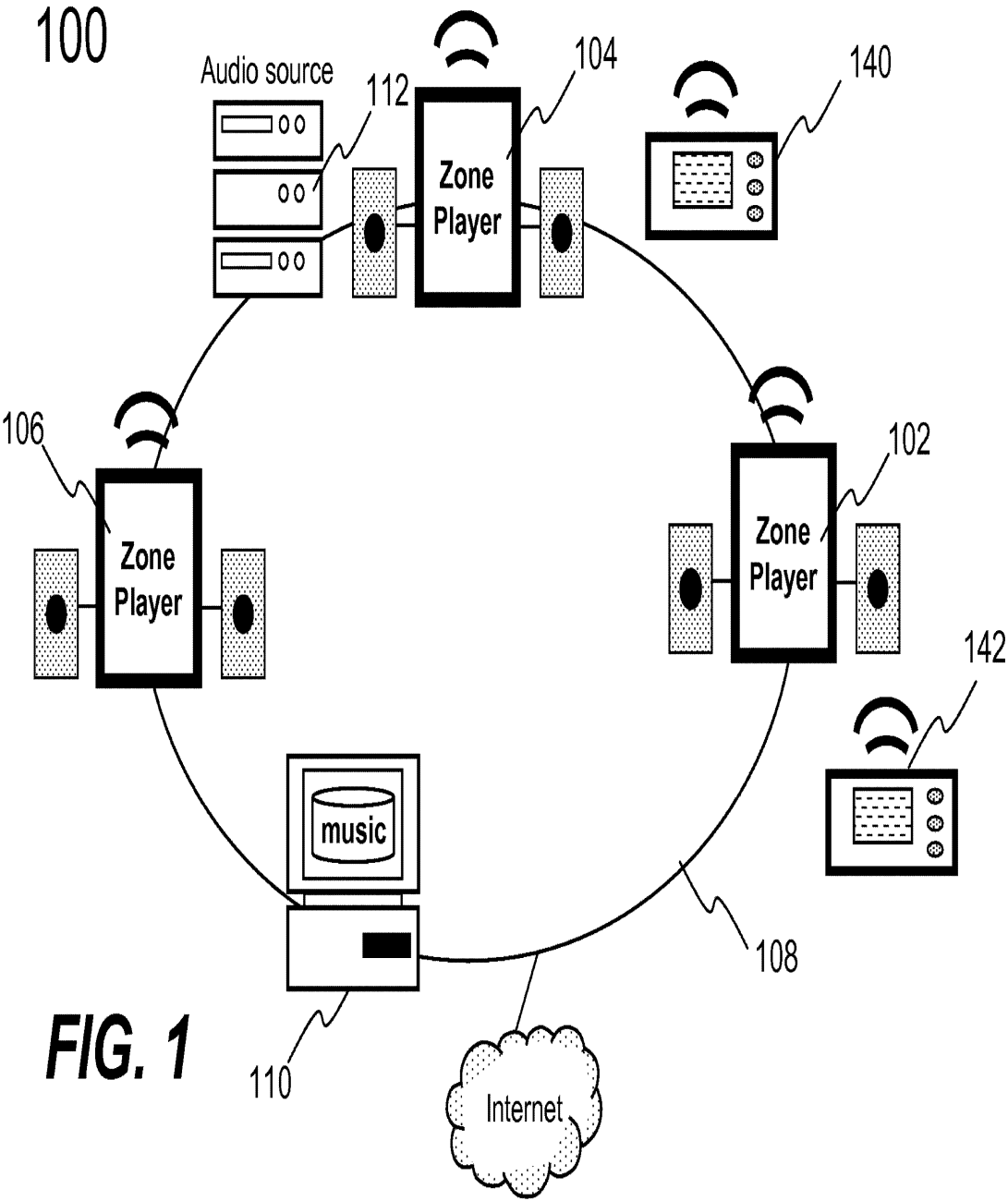
Annexed hereto is also an Appendix B providing examples to teach and refer to various features, detailed designs, uses, advantages,

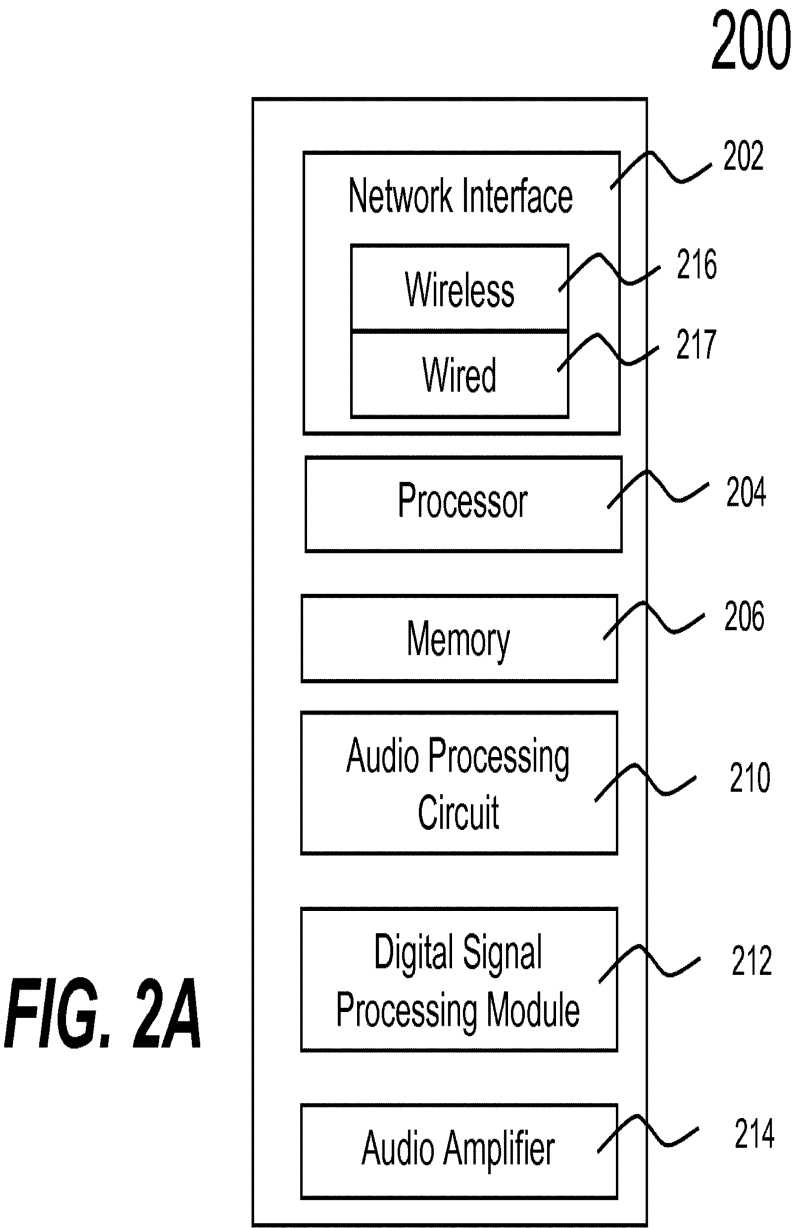
configurations and characteristics using clock in one embodiment of the present invention.

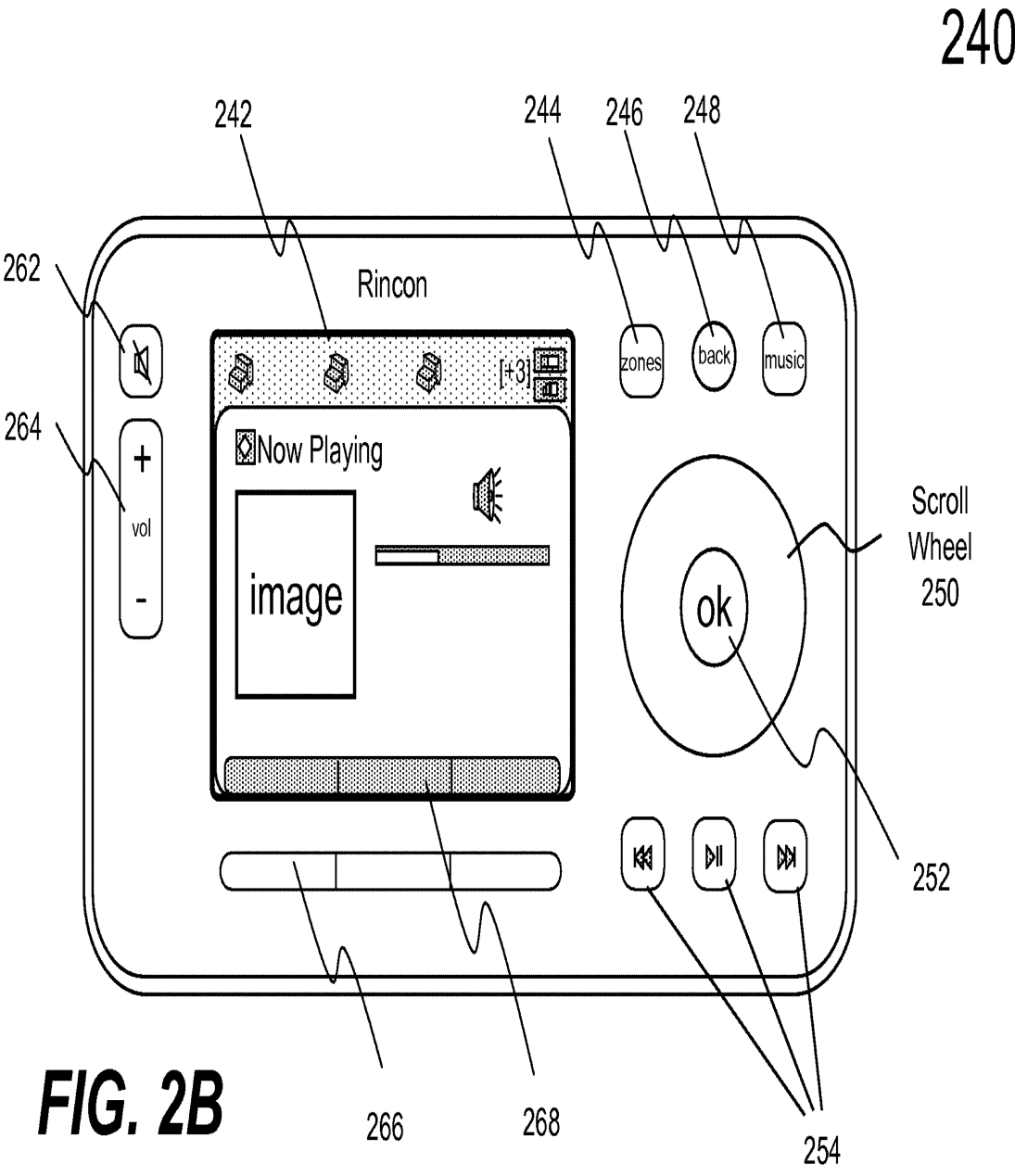
One of the features in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group
5 without interfering with other components that are potentially visible on the same wired or wireless network.

The processes, sequences or steps and features discussed above and in the appendixes are related to each other and each is believed independently novel in the art. The disclosed processes and sequences
10 may be performed alone or in any combination to provide a novel and unobvious system or a portion of a system. It should be understood that the processes and sequences in combination yield an equally independently novel combination as well, even if combined in their broadest sense; i.e. with less than the specific manner in which each of
15 the processes or sequences has been reduced to practice in the attached appendix.

The forgoing and attached are illustrative of various aspects/embodiments of the present invention, the disclosure of specific sequence/steps and the inclusion of specifics with regard to broader
20 methods and systems are not intended to limit the scope of the invention which finds itself in the various permutations of the features disclosed and described herein as conveyed to one of skill in the art.







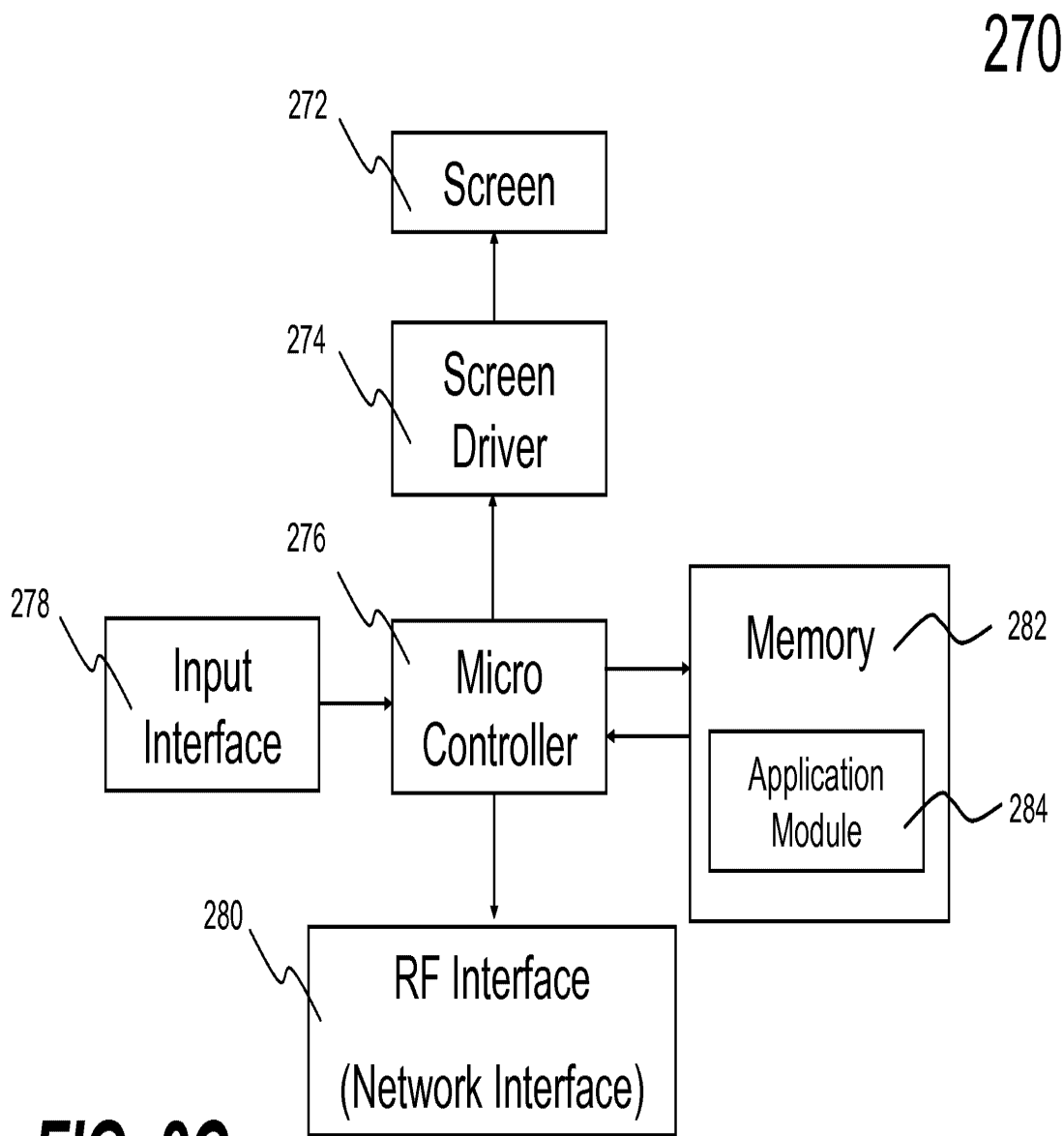


FIG. 2C

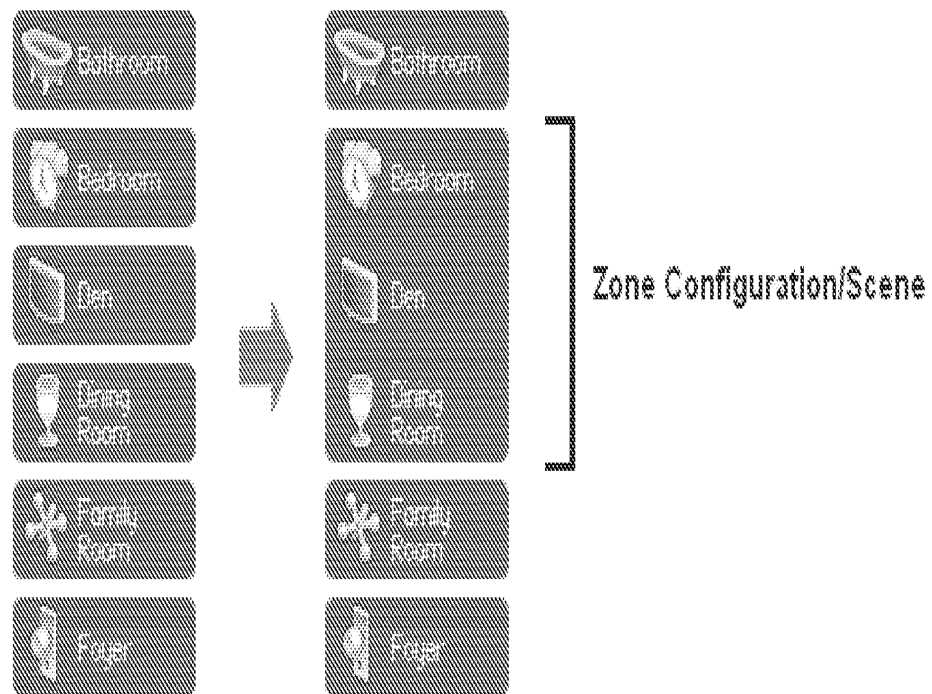


FIG. 3

Appendix A

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Sonos UI Specification: Zone Scenes

1 Introduction

The Zone Scene feature allows the user to arrange the zones into groups using one single command. However, the Zone Scene feature is much more flexible and powerful.

Currently in the Sonos UI, zone groups are created by manually linking zones one at a time until the desired zone grouping is reached.

For Example

Start with **Living Room**

- Link the Kitchen to the Living Room to make a group of (**Living Room + Kitchen**)
- Then link the Den to the (**Living Room + Kitchen**) to make a group of (**Living Room + Kitchen + Den**)

The Zone Scene feature would allow the user to create a group of (**Living Room + Kitchen + Den**) with one command.

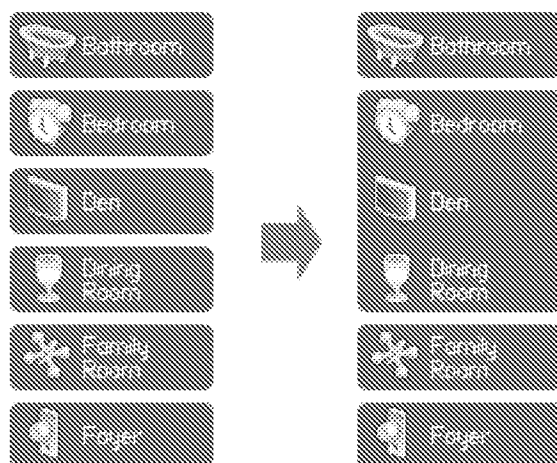
1.1 Setting a Zone Scene

1.1.1 Simple Scenes

Simple scenes allow the user to set up a single zone group per scene.

For example:

“Morning Scene” would group Bedroom + Den + Dining Room, but would leave all other zones in the house untouched.



Note: Zones do not need to be separated before the Scene is invoked.

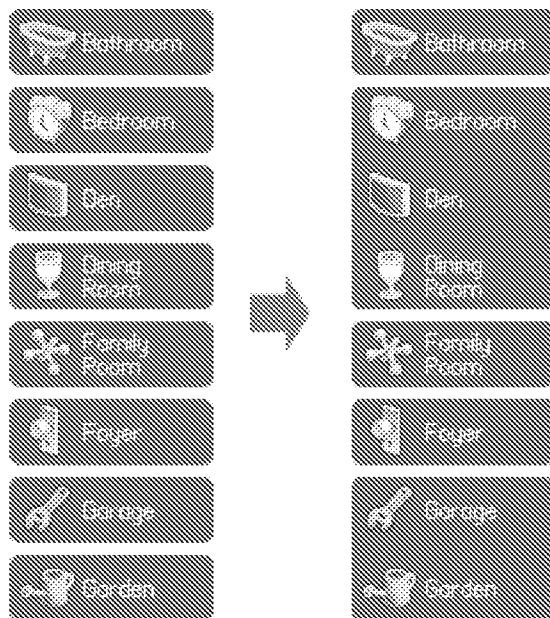
1.1.2 Advanced Scenes

Sonos UI Specification: Zone Scenes

User can define multiple groups to be gathered at the same time.

For example: “Evening Scene” should link the following zones

- **Group1**
 - Bedroom
 - Den
 - Dining Room
- **Group 2**
 - Garage
 - Garden
- **And finally**, Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.



Note: Zones do not need to be separated before the Scene is invoked.

Sonos UI Specification: Zone Scenes

1.1.3 What happens to the Music that's already playing when a Zone Scene is started.

If no music is playing in any Zone – then the zones will simply link in a group.

If music is playing in one or more zones there are several possibilities (TBD)

1. The Music Queue in the zone group that was formed by the Zone Scene will be empty. In other words – the music will stop in any room that is part of the Zone Scene. This is the simplest solution, but may lead to frustration.
2. The user gets to choose from which of the 'joining' Queues the new zone group should play. This could be in the form of a dialog:

What should the new Zone Group play?

No Music

Track 1

Track 2

Radio Station A

Note that this method would only be useful (and possible) with simple Zone Scene grouping. With Advanced Zone Scene groupings, this dialog would become much too complicated.

3. In the case where only one of the zones in the new group was playing music, the new group should take the music (and Queue) of that zone.

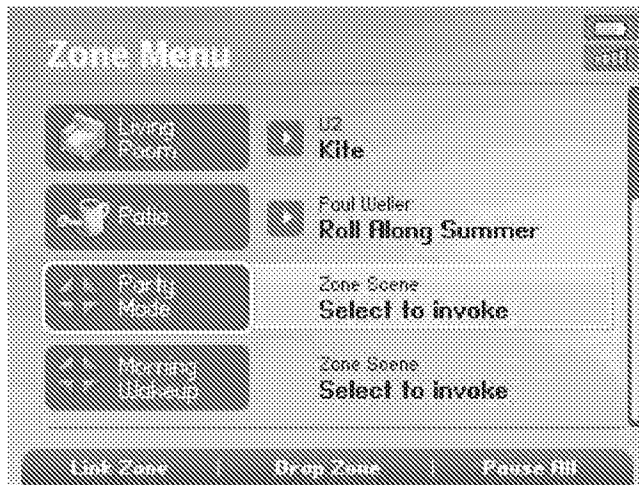
Sonos UI Specification: Zone Scenes

2 Invoking a Scene

There are various user Interface methods for invoking a configuration on a Handheld Controller or Desktop Controller

2.1 Handheld Controller

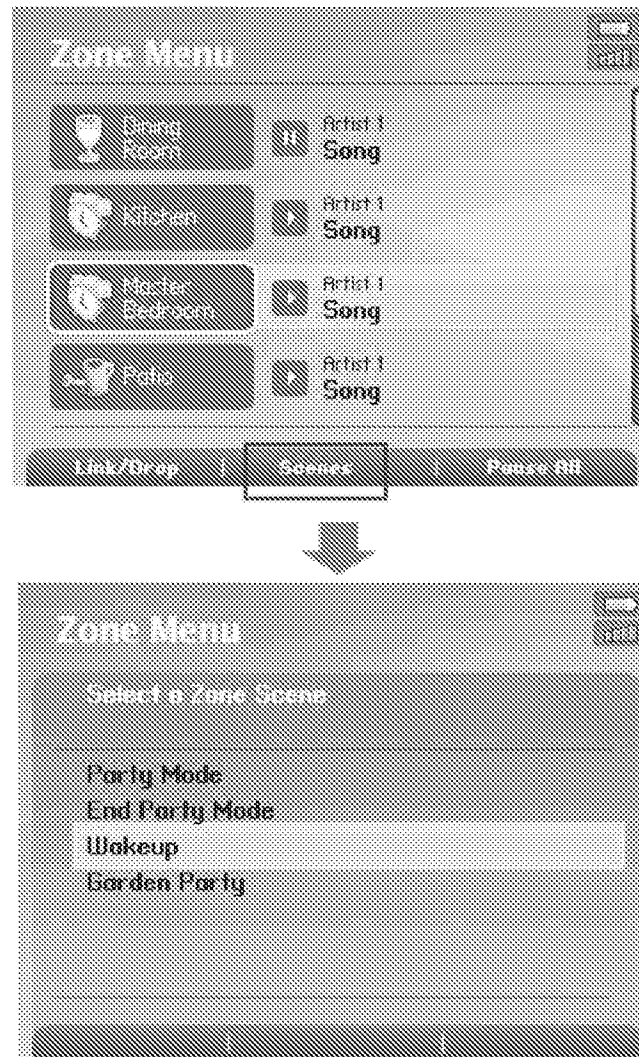
2.1.1 Method 1: Include Scenes in the Zone menu



Sonos UI Specification: Zone Scenes

2.1.2 Method 2: Zone Scenes as a soft button

The Link/Drop Zone commands are placed under one softkey and the middle softkey now becomes “Scenes”. Pressing the scene softkey will show the Scene menu where all the available scenes are shown.

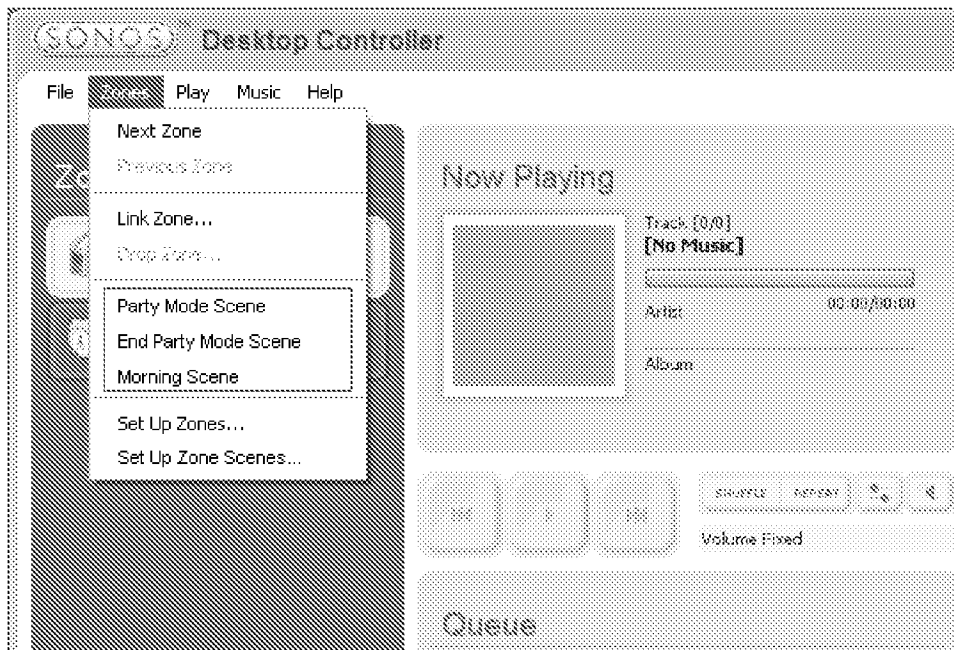


TBD: We could remove Pause All (and place it somewhere else. This would allow us to put Zone Scenes on the right soft button).

Sonos UI Specification: Zone Scenes

2.1.3 Method 3. Zone Scenes as part of “Link Zones” Dialog.



Sonos UI Specification: Zone Scenes**2.2 Desktop Controllers****2.2.1 Method 1: As part of 'Zones' application menu****2.2.2 Method 2: As part pf the Zones panel**

Sonos UI Specification: Zone Scenes

3 Scene Setup

3.1 Handheld Controller

It is not expected that the Zone Scenes should be set up using the Handheld Controller

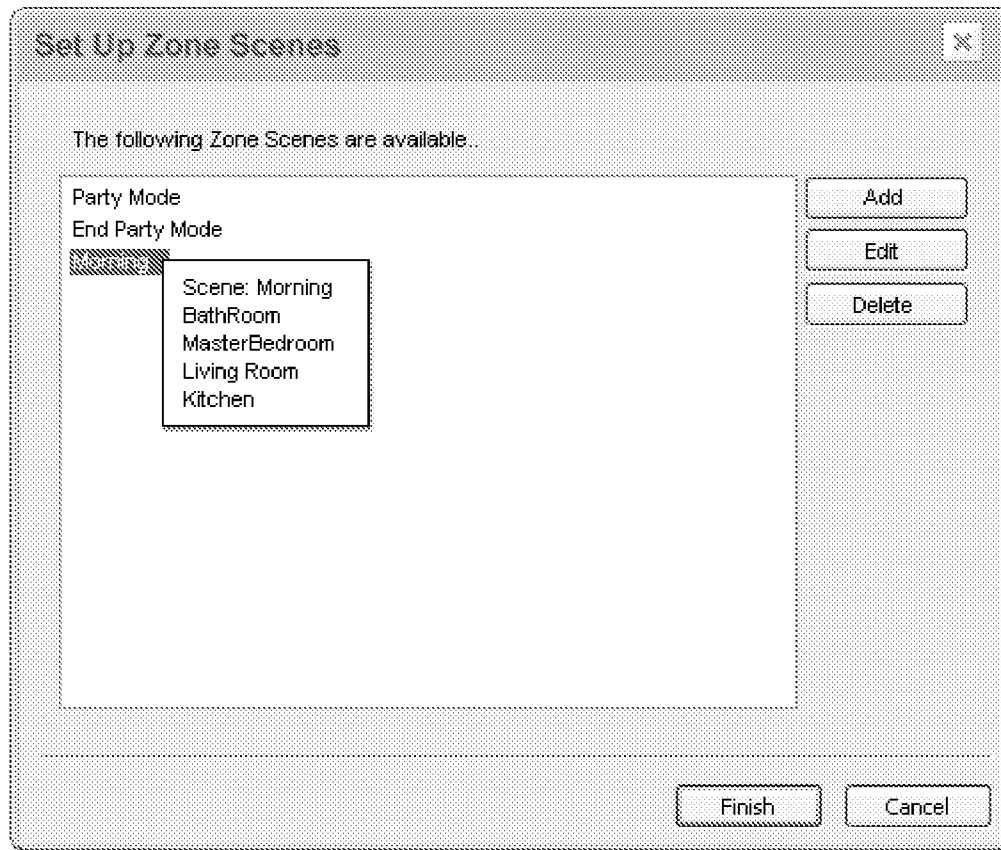
3.2 Desktop Controllers

Zone Scene Setup is available from the Zones menu on the DCRs.



“Set Up Zone Scenes...” is available from the Zones menu.

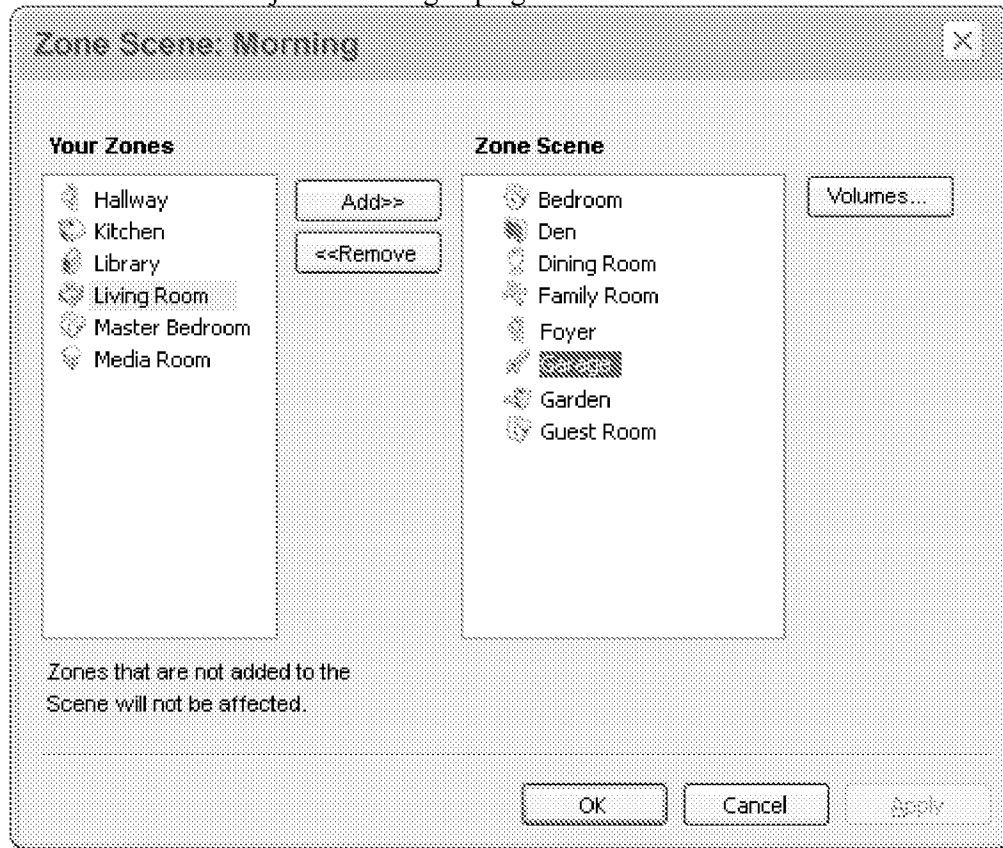
Sonos UI Specification: Zone Scenes



- Zone Scenes can be Add, Edited or Deleted
- The tool tip shows an overview of the zones that make up a scene

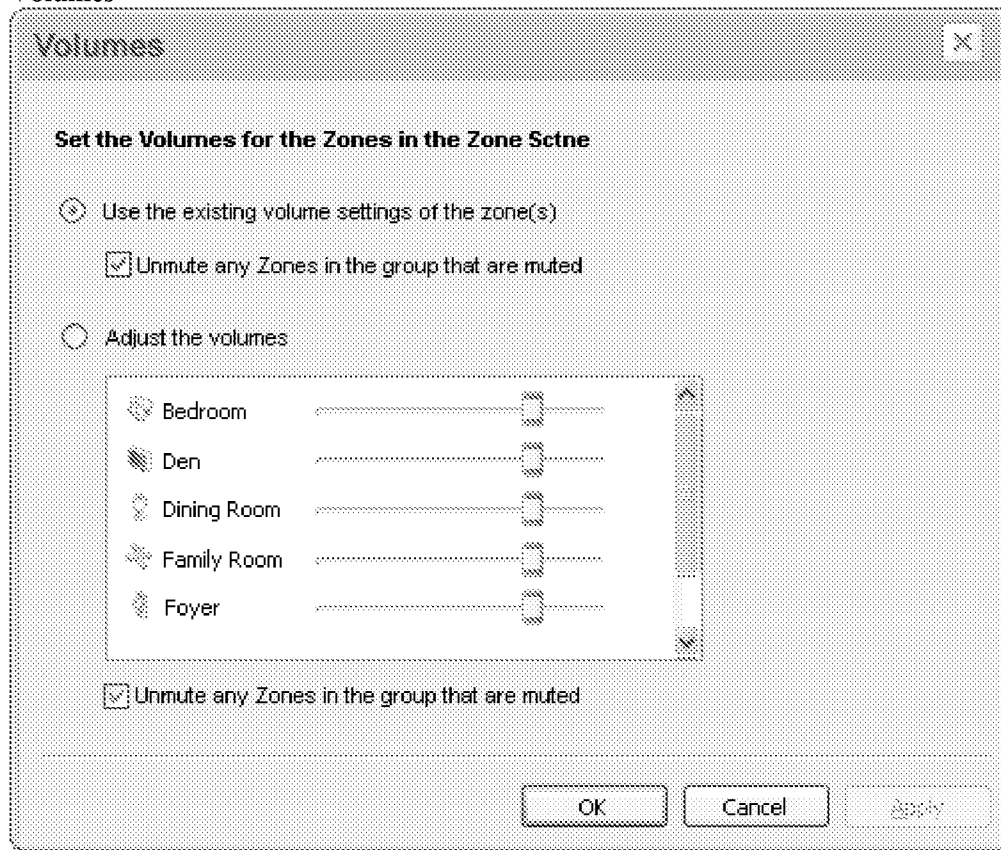
Sonos UI Specification: Zone Scenes**3.2.1 Simple Scenes**

Each Scene consists of just one zone grouping.



- The panel on the left shows the available zones in the household.
- The panel on the right shows the Zones that will be grouped as part of this scene.
- The Add/Remove buttons move zones between the panels.
- Zones can be dragged between panels.
- The Zones that are not part of this scene will remain unaffected by the scene.

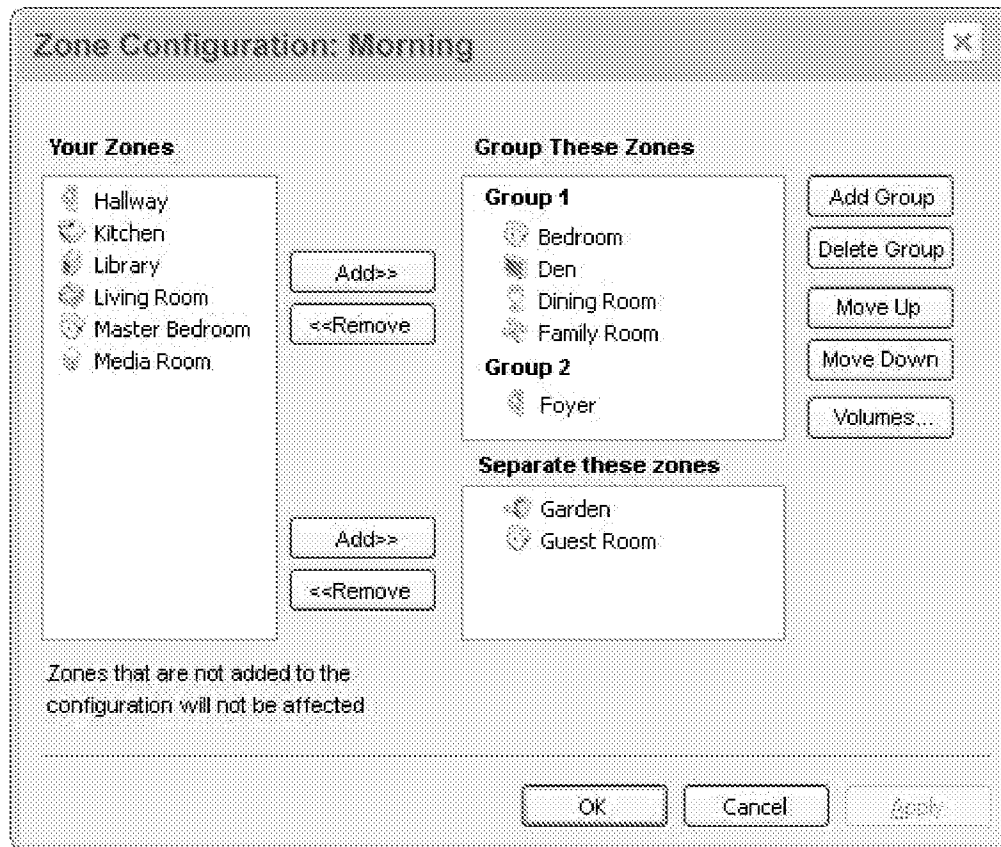
Volumes



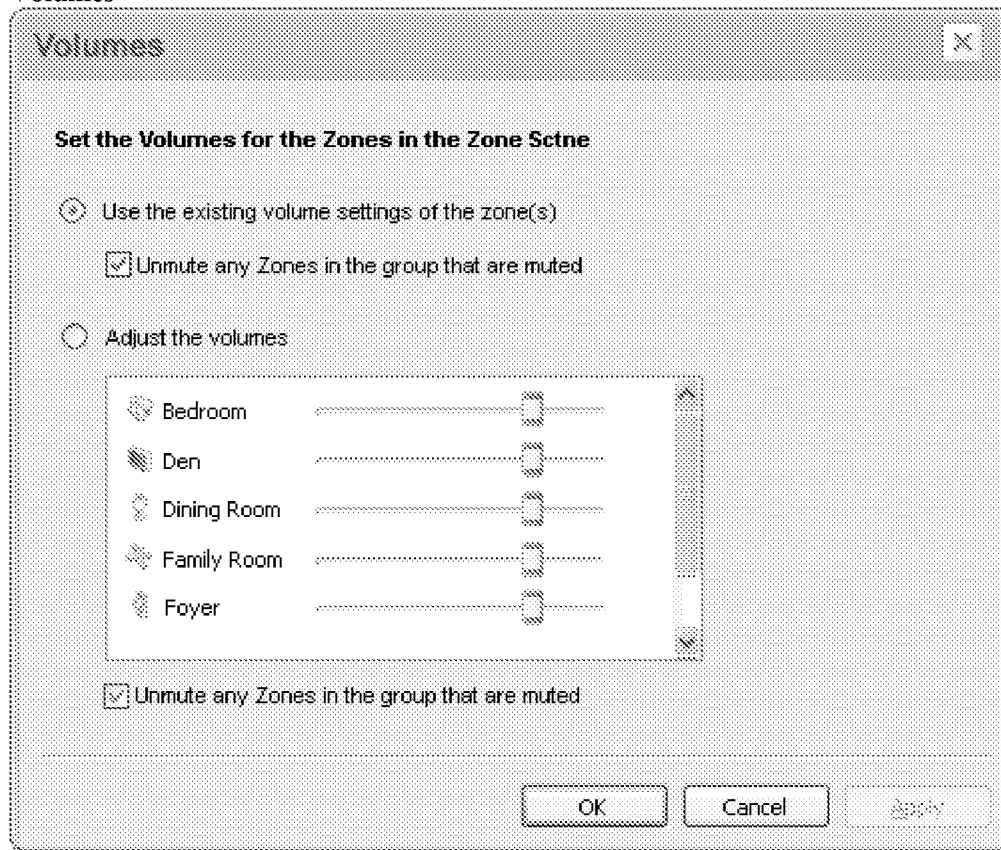
- The ‘Volumes...’ button allows the user to affect the volumes of the zones when a Zone Scene is invoked.
- The Zones can be set to retain whatever volume that they currently have when the Scene is invoked.
- Additionally the user can decide if Volumes should be unmuted when the Scene is invoked.
- Alternatively, the user can define the Volume of each zone in the Zone Scene.

3.2.2 Simple Scene (each scene makes one zone group)

Each Scene can consist of multiple groupings. In addition zones can be separated if they were part of a group before the scene was invoked.

Sonos UI Specification: Zone Scenes

- Left panel shows the available zones in a system
- The upper right panel shows the zones that will be grouped as part of this configuration.
 - Multiple groups can be created with the “Add Group” button
 - Groups can be deleted using the “Delete Group” button
 - Zones can be moved between groups
- The lower right panel shows the zones that will be actively separated when the scene is invoked (if they were part of any before).
- Zones can be moved from the left panel to either of the right panels using the “Add” buttons, or through drag and drop/
- Likewise, zones can be moved from either of the right side panels to the left panel using the “Remove” buttons, or through drag and drop.

Sonos UI Specification: Zone Scenes**Volumes**

- The ‘Volumes...’ button allows the user to affect the volumes of the zones when a Zone Scene is invoked.
- The Zones can be set to retain whatever volume that they currently have when the Scene is invoked.
- Additionally the user can decide if Volumes should be unmuted when the Scene is invoked.
- Alternatively, the user can define the Volume of each zone in the Zone Scene.

3.3 Additional setup ideas

Capture a Zone Scene from an existing setup in the Zone Menu. Right click on a current Zone group and have a menu item “Make this group a Scene”.

4 Alternative Linking Methods

4.1 Multiple Select in Link and Drop Zone panels

This feature is an adaptation of the Link and Drop Zone feature.

Currently, as discussed in the introduction of this document, the current Link and Drop Zones features allow the user to link and drop Zones one at a time. This feature would allow the user to link and drop multiple zones in one screen.

Using this methodology, the action Link and Drop zones can be achieved on one screen. In addition, because of the flexibility of this UI, Music can easily be moved from one zone to another.



- The list of zones in the screen above includes ALL the zones in the system, including the Zones that are already grouped.

Sonos UI Specification: Zone Scenes

- User can check Zones that will be part of a zone group, and uncheck those that won't be part of a group
- Using this method it is possible to move music from one zone to another. For example, to move the music from the Living Room to the Kitchen
 - User is playing 'Radio 1' in the Living Room only
 - From the Zone Menu, press the Zone Linking soft button
 - Check the Kitchen, uncheck the Living Room
 - Hit the OK button
 - Result – Radio 1 is now playing in the Kitchen and not the Living Room (without interrupting the music).

Sonos UI Specification: Zone Scenes

5 Related Ideas

5.1 Zone Scenes that play music

In addition to the notion of Zone Scenes that contain information about Zone Groups and the Volumes of individual Zones in a group. It is also possible to extend the idea to enable specific music to be played when a particular Zone Scene is invoked:

For instance.

Wakeup Zone Scene should link Living Room and Bedroom, set their volumes and play “Wakeup Music” playlist (or a Radio station)

5.2 Relationship to the Alarm Clock

The Sonos Alarm Clock/Music Scheduler allows a user to setup a Sonos system to play music in certain zones at certain times of the day.

In addition it is possible that an alarm clock can also invoke a Zone Scene.

For example. In a system with 4 Zones: Bedroom, Bathroom, Dining Room, Kitchen.

At the end of the day the user has all of the Zones linked into one group.

He has an alarm clock that is set to play National Public Radio at 7am and the alarm should play in the Bedroom and Bathroom, but not the Dining Room and Kitchen.

The Alarm is thus configured to invoke a Zone Scene that links the Bedroom and Bathroom into a group, but leaves the Dining Room and Kitchen out of the group.

Sonos UI Specification: Zone Scenes

5.3 Compress Zones in the Zone Menu

This concept is aimed at households that have more than a few ZonePlayers.

Current Design.



Zone Groups are shown linked together in a gray box. This is a good design for household with fewer than, say, 8 Zones. With more Zones however, a lot of scrolling is required to navigate between zones.

The design below shows how grouped zones are compressed so that they occupy a single item in the Zone Menu. The [+n] signifies the additional number zones that make up the group.



The individual zones in a group WILL show in the Zone bar on the Now playing Screen and Music Browse, as well as the link and unlink screens.

Appendix B

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Sonos UI Specification: Alarm Clock

1 To Do Items

1.1.1 To Do

- Graphic Design for clock face – may need PixelMedia input
- Tone for backup buzzer to be designed
- Scenarios for backup buzzer

1.1.2 TBD items

- Should the low brightness clock face move around the screen as a screen saver (repositioned every once in a while (not sliding around)
- Add play mode (shuffle/repeat)
- Default settings for a new alarm
- Can the DCR sleep timer count in the menu change with time, or does it need to be fixed.
- Should time and date settings fields change if the user has 12/24 hour clock etc.
- Rhapsody and Current Queue as music choices for an alarm.
- DCR state when time is lost (due to power failure)

Sonos UI Specification: Alarm Clock

2 Requirements

2.1 Need

Regular requests from users to provide the following:

- Ability to schedule music to wake to.
- Ability to schedule music at other times. For example, “I want to hear music when I come home from work at 6pm”
- Ability to fall asleep playing music, and for the music to play for a defined period (Sleep Timer)
- Ability to replace their current alarm clock with a large clock view on the Controller.

2.2 General rules for the alarm

2.2.1 Zones

- A single zone can be assigned to an alarm. When the alarm sounds, it will sound in that zone + any zones are linked to the alarm zone at the time of the alarm

2.2.2 Volume ramp

- Alarms will ramp from 0 to the zone’s set volume level in 60 seconds (exact time TBD)

2.2.3 Backup Buzzer

If, for any reason, the scheduled music won’t play (empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in ZPs –not on a share (for obvious reasons).

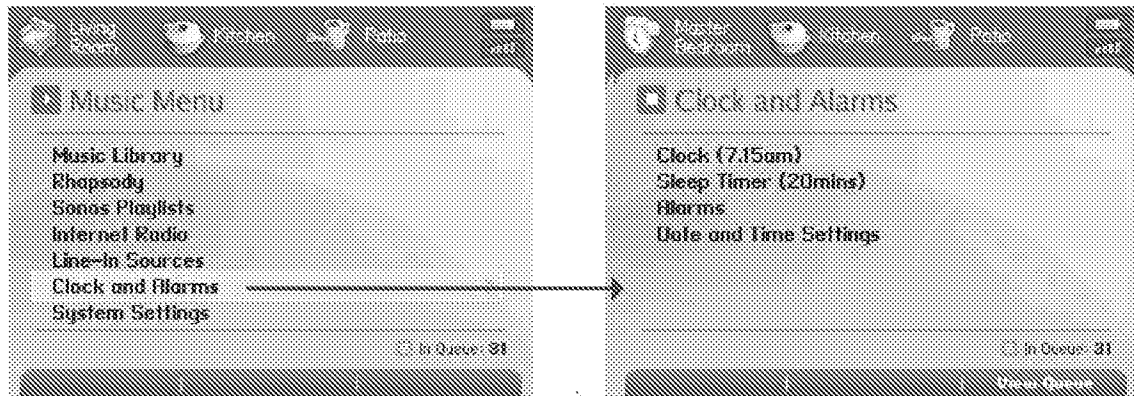
The buzzer sound will be designed for Sonos and will fit the Sonos brand

Sonos UI Specification: Alarm Clock

3 UI Spec for Handheld CR

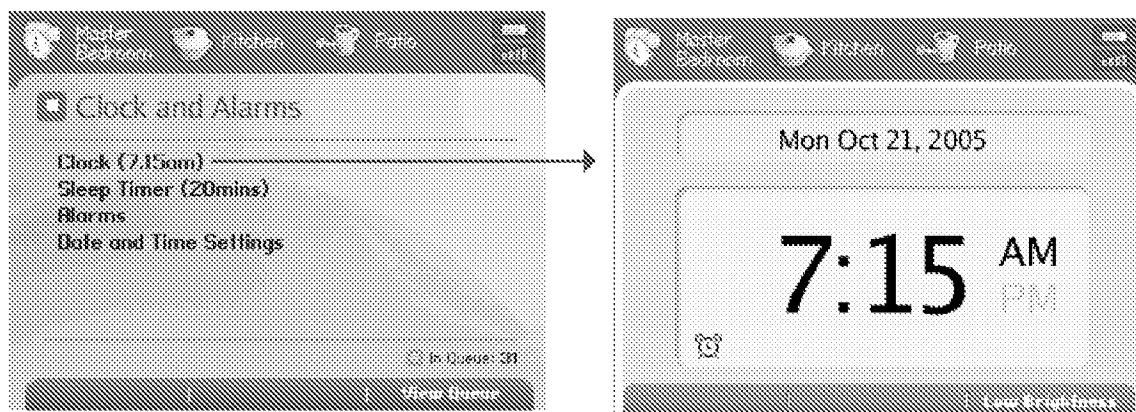
3.1 Clocks and Alarms Menu


- The Clocks and Alarms section of the UI can be found on the Music Menu above System Settings



- The time in parenthesis after the “Show Clock” item should be updated with the current system time.
- The time in the parenthesis should be removed if the system has no time set (because the time was never set properly, or a connection to the Internet time has been lost and the ZP power-recycled)

Sonos UI Specification: Alarm Clock

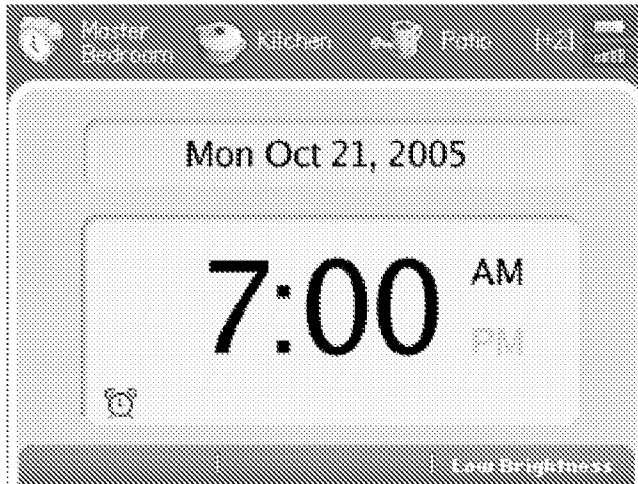
3.2 Show Clock Screen

- The clock is zone-group contextual.
- Press OK on this screen returns the user to the Clock menu (same behavior as a pop-up).
- Press Back on this screen returns the user to the Clock menu (same behavior as a pop-up).
- The clock icon  indicates that one or more alarms are set for this zone group.
- Unlinking a zone, may affect the presence of the alarm icon.
- The 'low brightness' softkey brings up a version of this screen shown below.

3.2.1 Low Brightness mode

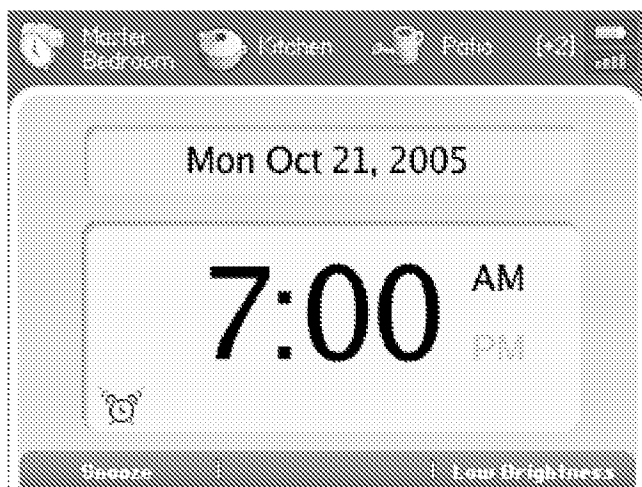
- When the user presses the "Low Brightness" soft button, the screen brightness will be reduced to 25%. The user setting in the CR settings will not be affected.
- Pressing any button will return the screen to the user-set brightness.
- When an alarm goes in that zone/group, the contrast will return the screen to the user-set brightness.

Sonos UI Specification: Alarm Clock

3.3 Alarm Plays**Clock Screen**

- The clock icon shows if there is at least one alarm in the ON state for one or more of the zones that the CR is currently viewing (in this case Master Bedroom, Kitchen, Dining Room).
- If no alarms are present, in the ON state, for the zone or zones that the CR is viewing, the icon will be removed.
- Note the case where an alarm is set to “Once” - when the alarm is complete (see duration and snooze rules below) the icon will be removed (as long as there are no further alarms set for zones in this group).

Sonos UI Specification: Alarm Clock

Alarm Plays

The clock icon changes to its “active state” (the sound waves).
The snooze softkey appears.

The Snooze and the active clock icon will be displayed:

- For the duration of the Alarm, up to a maximum of 2 hours (if the user has set the duration to ‘no limit’, the snooze and active clock will show for 2 hours only).
- AND as long as music is playing in that Zone Group. If the music is stopped, the snooze button and active state clock icon are cleared from the UI
- ‘Stopped music’ can be achieved though:
 - Play/pause button
 - Clear Queue
 - Music Queue ends (runs out of music)
 - Technical reason for music stopping (lost connection etc.)

The Snooze button and active clock icon can be passed around zones using link/unlink in the same way as the alarm duration.

Snooze operation

- Pressing the snooze button will cause the alarm to play again 9 minutes later (the actual Alarm settings are not changed).
- Pressing the snooze button again during the ‘snoozing period’ (the silent period), will offset the alarm by 9 minutes from that point.
- Multiple presses of the snooze button will not accumulate snooze time (9+9+9=27 minutes snooze).
- During the 9 minute snooze period, a ‘snoozing’ icon will show on the screen
- During the 9 minute snooze period, the clock icon will continue to show its ‘active clock’ state.
- During the 9 minute snooze period, the Snooze softkey will continue to show.
- If the music is stopped (see rules above) – the snooze state will be cleared (removing the Snoozing icon and Snooze button).

Sonos UI Specification: Alarm Clock

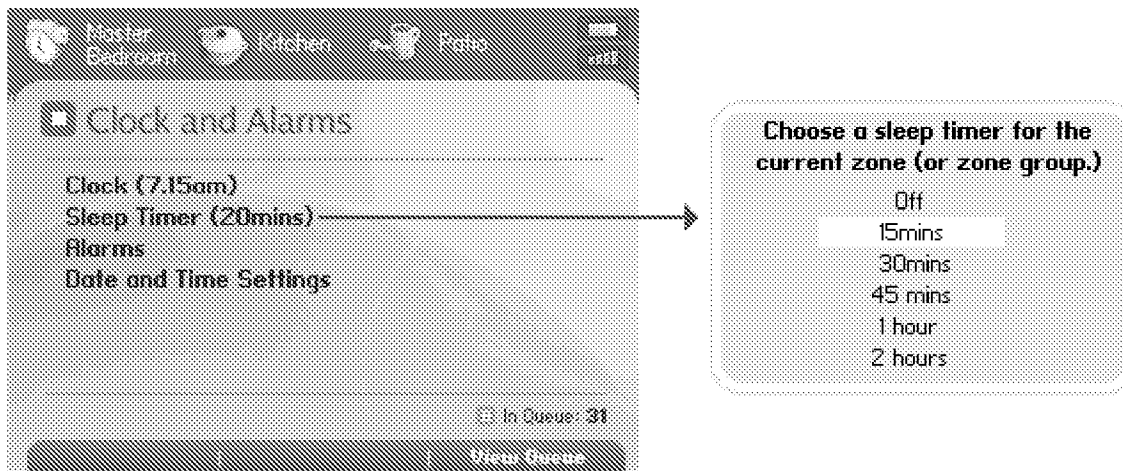


Other items

If another alarm plays for a zone in this group – all the original alarm and snooze states are cleared.

Low Brightness

Same rules apply as described above

Sonos UI Specification: Alarm Clock**3.4 Sleep Timer**

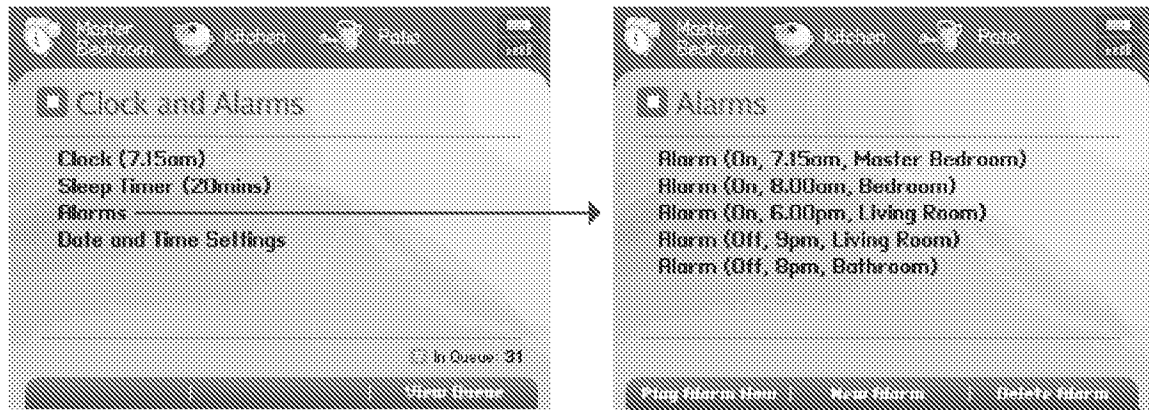
- Sleep timer will have the following variables: Off, 15min, 30mins, 45mins, 1hours, 2 hours.
- A sleep timer applies to all the current zones in the current group
- When the sleep timer stops (i.e. the time reaches 0 seconds), it should revert to 'Off'.
- At the end of the sleep time (0 seconds), the current Zone Group should be Paused.
- The time in parenthesis should show the count down.
- If the current zone group is already paused, no changes to the play head will be made.
- (the alarm timer is the same as the sleep time, described later in this document)

Rules for Zone Group changes while the Sleep timer is active

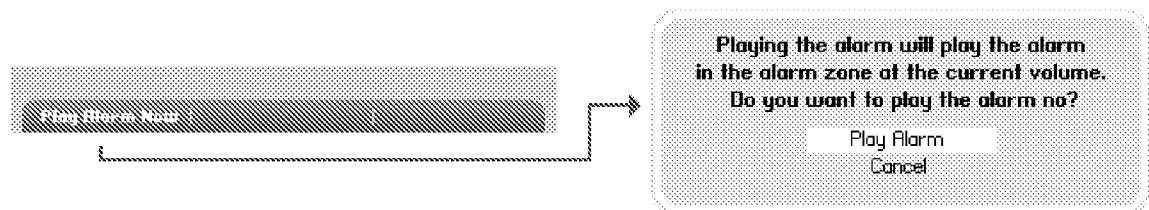
- A Sleep timer is set for the current zone (or zone group) that the user is viewing on the CR. The timer is applied to all the zones in that particular group.
- Any zone added to the zone group takes on the same timer.
- Any zone dropped from the group will have it's timer reset to Off.
- Any zone taken by another group will take the timer of the group it is joining (i.e. it will lose it's original timer).
- Pausing the music has no effect on a sleep timer .
- Clearing the Queue has no effect on a sleep time .
- Altering the Queue (adding, moving, deleting tracks) has no effect on the sleep timer
- The user can change the timer settings while it is running (i.e. turn it off, or change the sleep time).

Sonos UI Specification: Alarm Clock**Alarm length/Sleep timer icon on Now Playing Screen**

- The sleep timer icon is shown next to the Shuffle and Repeat icons
- The right edge of the snooze icon aligns with the right edge of the track progress bar
- The separation between the icons is 5 clear pixels
- The blue Rhapsody Radio 'bubble' should be horizontally resized when the snooze icon is present.
- The gap between the right edge of the blue bubble and the left edge of the snooze icon should be 5 clear pixels.
- The snooze icon should sit in the vertically in the middle of the blue bubble (5 pixels above, 5 below).

Sonos UI Specification: Alarm Clock**3.5 Alarms Overview**

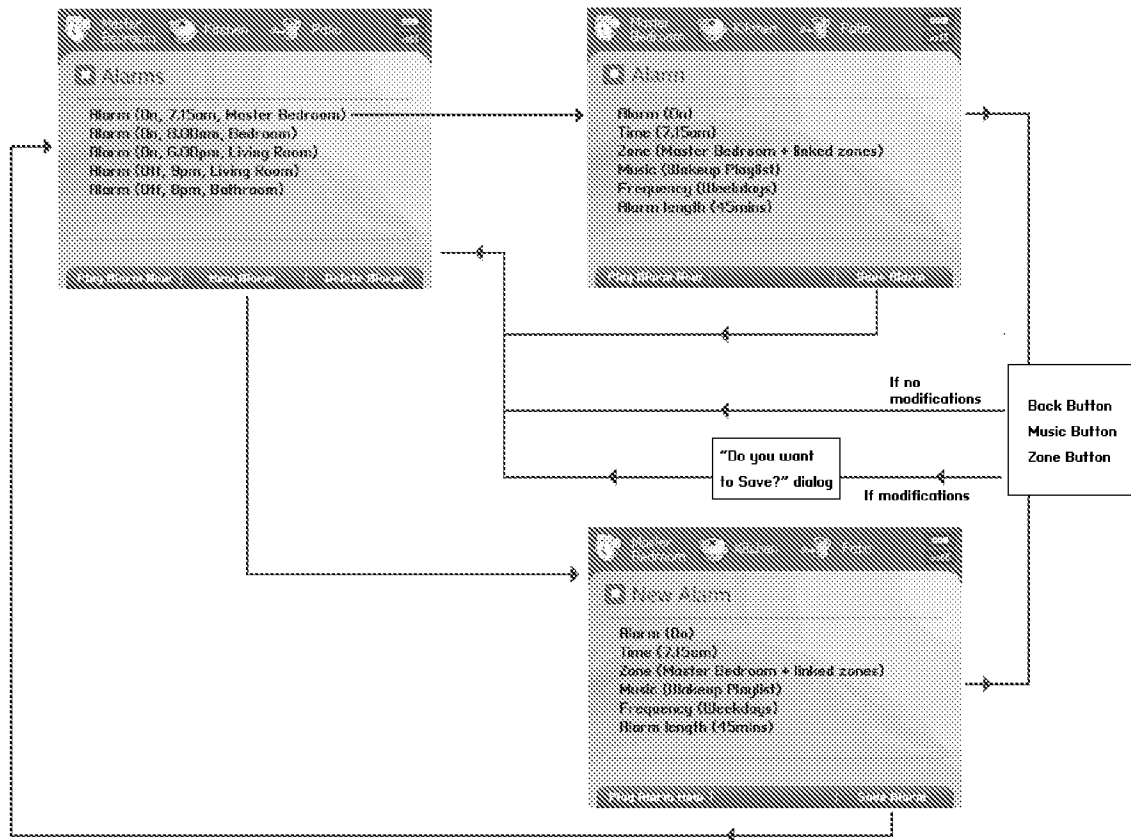
Note the absence of the View Queue and Queue Counter when we go one level deeper in the alarm UI. This is to reduce any confusion that may occur between the Alarm music and the Current Queue of music.

Play Alarm Now soft button

User selects 'Play Alarm' from the pop-up. The alarm will activate.

- The UI will stay on the same screen (but without the popup)
- TBD – this may change if alarms automatically trigger the clock view

3.6 New Alarm and Editing an existing alarm



New Alarm

- Adds a new alarm with the default settings
- The screen navigates to show the new alarm page.
- The system can contain up to 32 alarms
- If the limits of 32 alarms is reached, add alarm will trigger the following popup message (the UI will not navigate to the “New Alarm” page).
 - You can’t add any more alarms, please delete an alarm before you add a new one.
 - Press Ok to Continue.
- The default settings for an alarm are described in the section below.

Edit Alarm

Clicking OK on an existing alarm will navigate the UI to that alarm’s edit page.

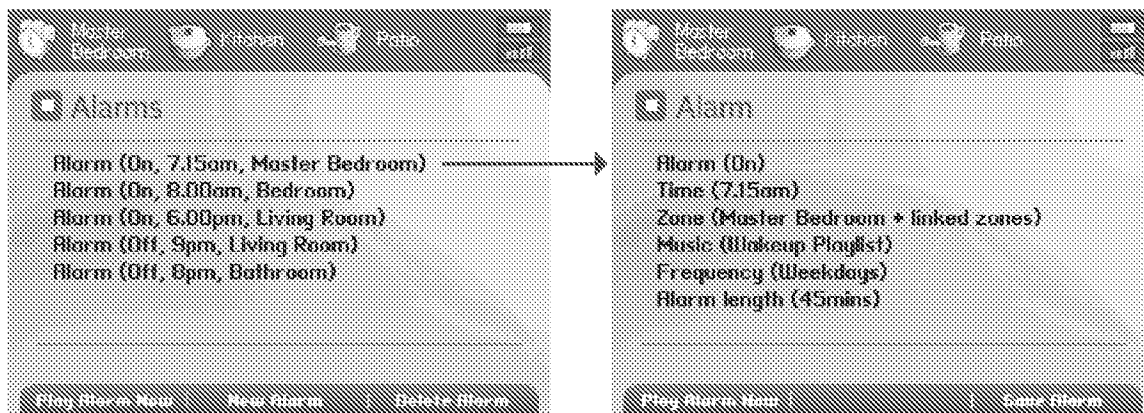
Save Alarm

Pressing the Save button will save the alarm and navigate to the Alarms List screen. No confirmation will be shown (Save is an explicit action that doesn’t result in deleted information if pressed by mistake).

Sonos UI Specification: Alarm Clock**Navigating Away from the New/Edit Alarm page**

If an alarm has been edited, or the alarm is new and the following navigation buttons are pressed, a resultant confirmation box will be shown.

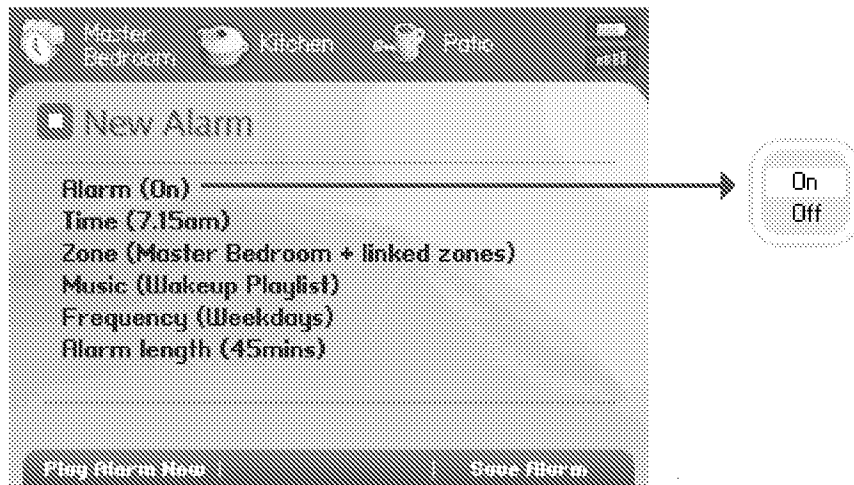
Back button
Zones button
Music button

**3.7 Alarm Settings/Variables**

Each alarm will have the following variables

- Alarm On/Off
- Time
- Zone
- Music
- Frequency [once]
- Alarm Length
- *Play Mode (TBD we may add shuffle mode as an option)*

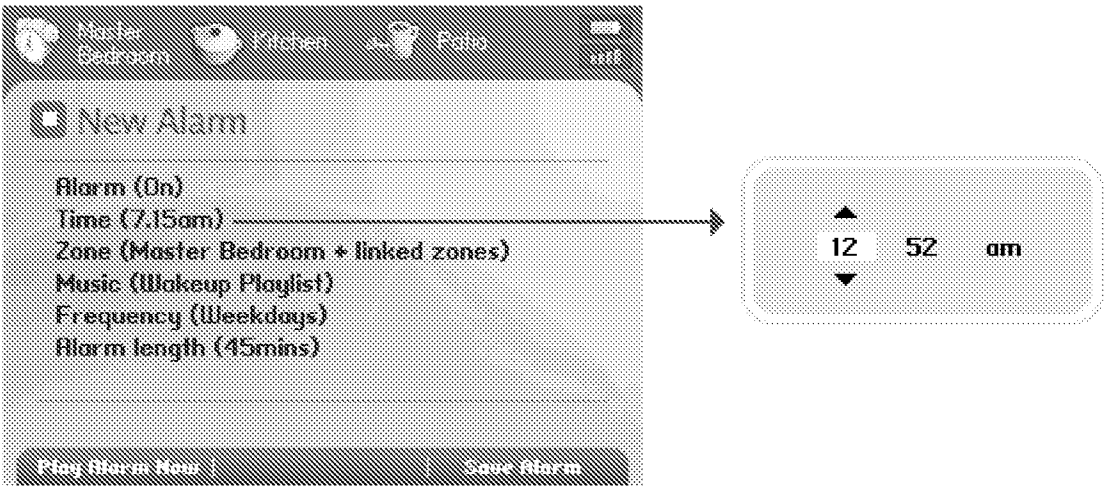
Sonos UI Specification: Alarm Clock

3.7.1 Alarm on/off

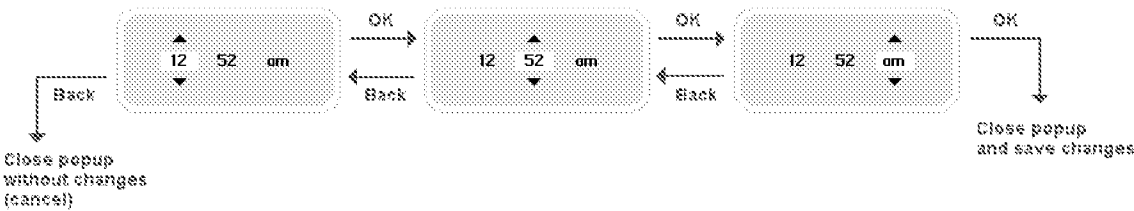
This allows the alarm to be turned on/off without losing the alarm settings.

Sonos UI Specification: Alarm Clock

3.7.2 Alarm Time

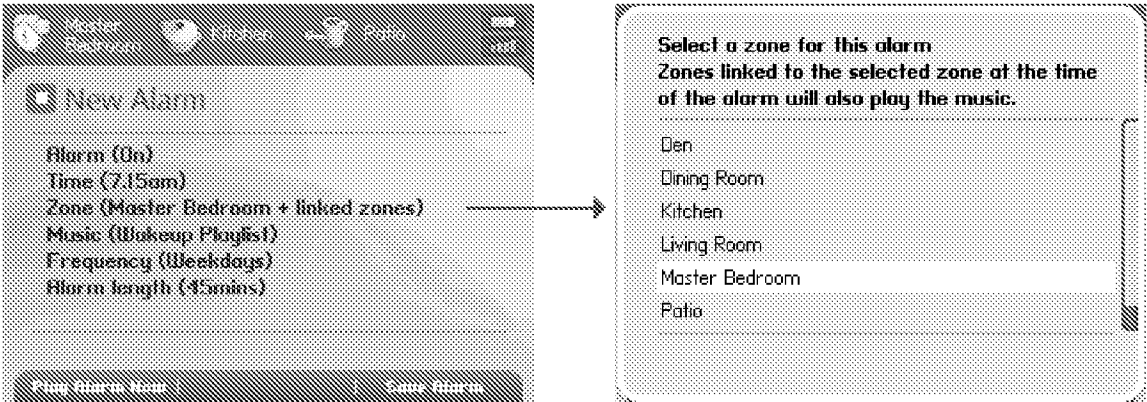


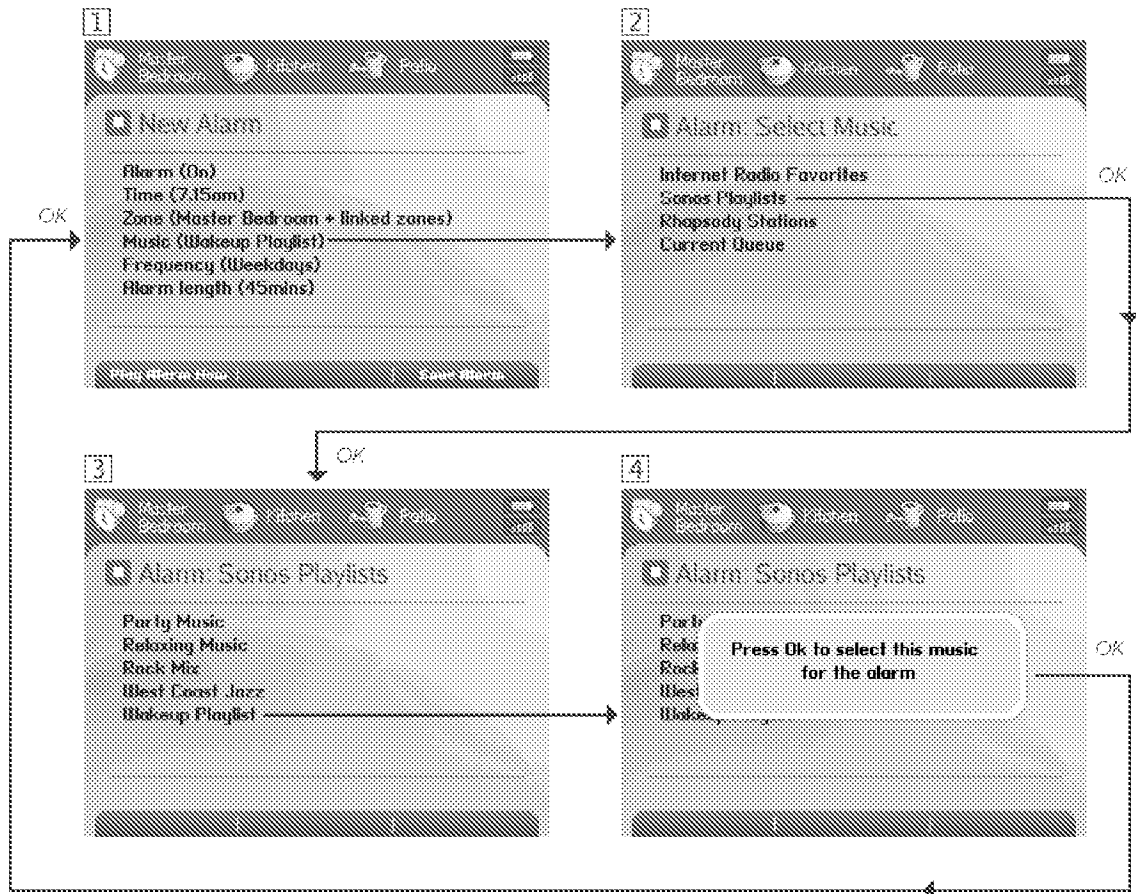
- The time set popup consists of three fields
- TBD – should the 3 fields become 2 if the user has set the system to 24 hour clock?



Sonos UI Specification: Alarm Clock

3.7.3 Alarm Zone



Sonos UI Specification: Alarm Clock**3.7.4 Alarm Music**

- The Select Music UI is a limited form of the regular CR music browse
- The user should not be able to drill down to the track level
- On the level *above* the track level, if the user presses OK, they will see the confirmation dialog.
- When the user press OK on the confirmation dialog, the UI should return to the main Alarm variables page (top left of above diagram). This transition is made without an animation.
- Rhapsody Stations and Current Queue are TBD items

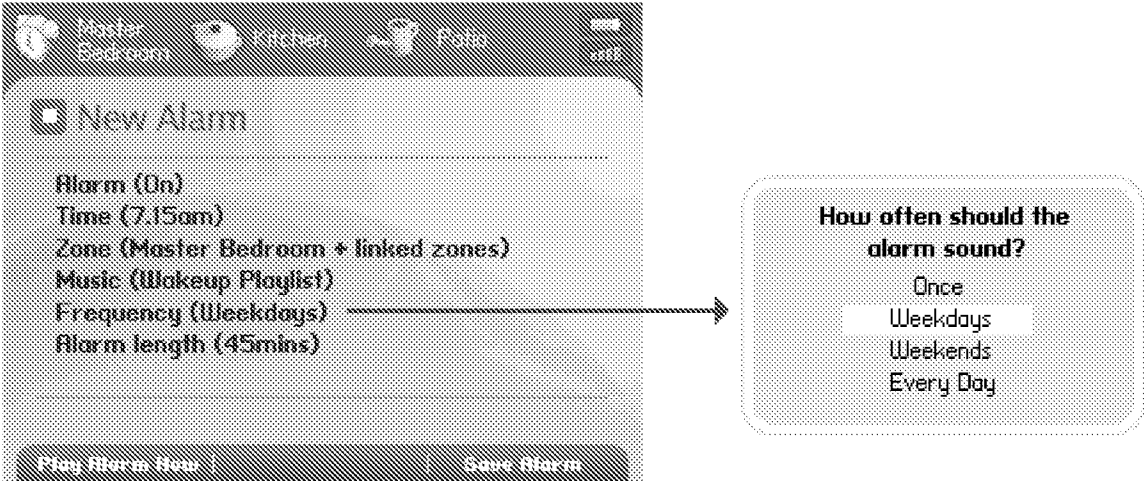
Relationship to the Now Playing Screen and Back Button.

If the user presses the Music button while on the alarm screens, the UI will navigate to the Now Playing screen.

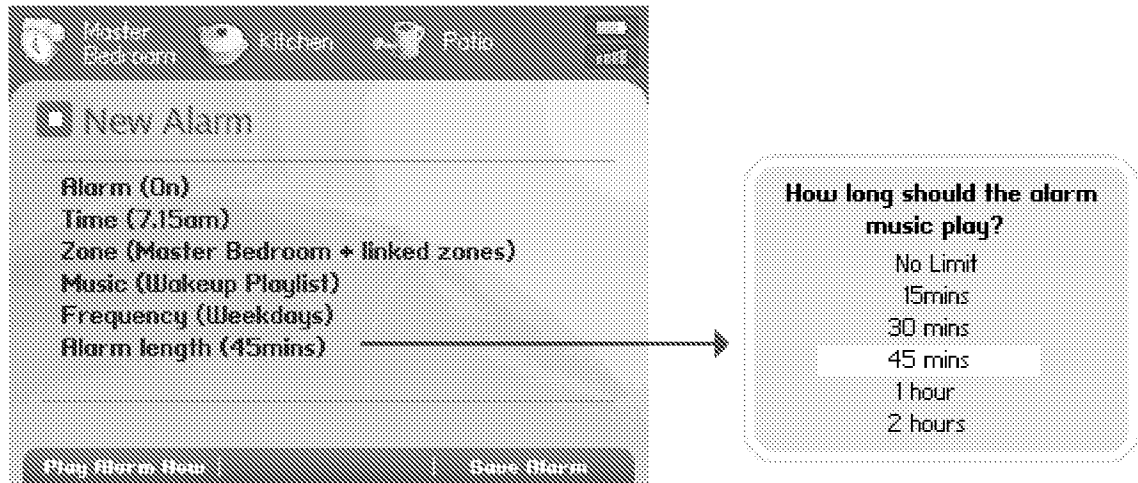
If the user navigates to the Now Playing screen from screens 2, 3 or 4 (above), and subsequently press the Back button, the UI should navigate back to screen 1 (and not 2, 3, or 4). This is designed to avoid confusion between the Music choices for the alarm and music choices for general playback.

Sonos UI Specification: Alarm Clock

3.7.5 Alarm Frequency



Sonos UI Specification: Alarm Clock

3.7.6 Alarm Length

- The 'No Limit' option means that no alarm timer will be set
- The alarm timer is the same as the sleep timer.
- When an alarm with a timer (anything other than 'no limit') starts, the sleep timer for the zone (or zone group) is triggered.
- Users can override the alarm timer by setting the sleep timer.

Zone linking/unlinking activities

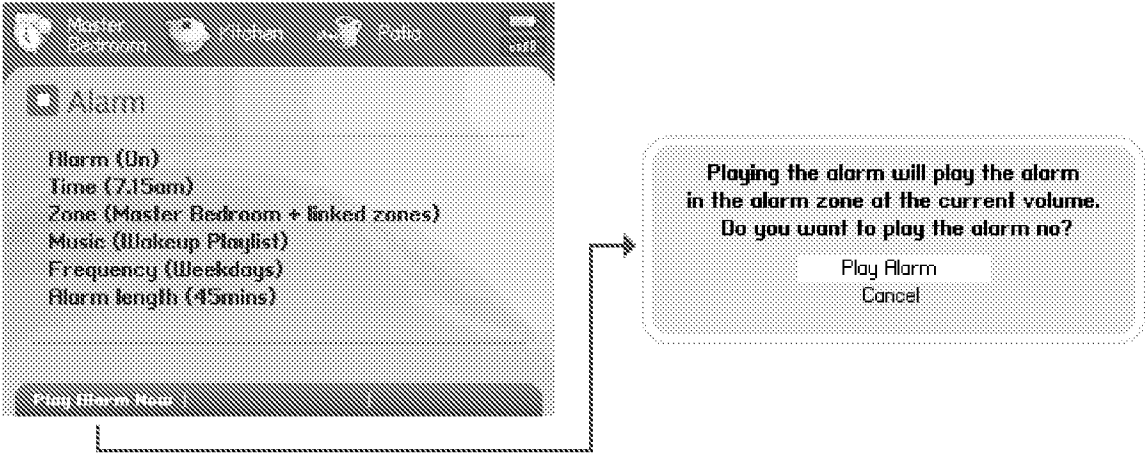
- The alarm length applies to the zone group at the time the alarm is triggered (zone + any linked zones)
- Any zone later added to the group will take on the timer from this alarm.
- Any zone dropped from the group will no longer take part in the alarm length timer.
- Any zone from this group taken by another group will take the timer of the group it is joining (i.e. it will lose it's original timer).
- Pausing the music has no effect on the alarm length timer .
- Clearing the Queue has no effect on a sleep timer .
- Altering the Queue (adding, moving, deleting tracks) has no effect on the sleep timer

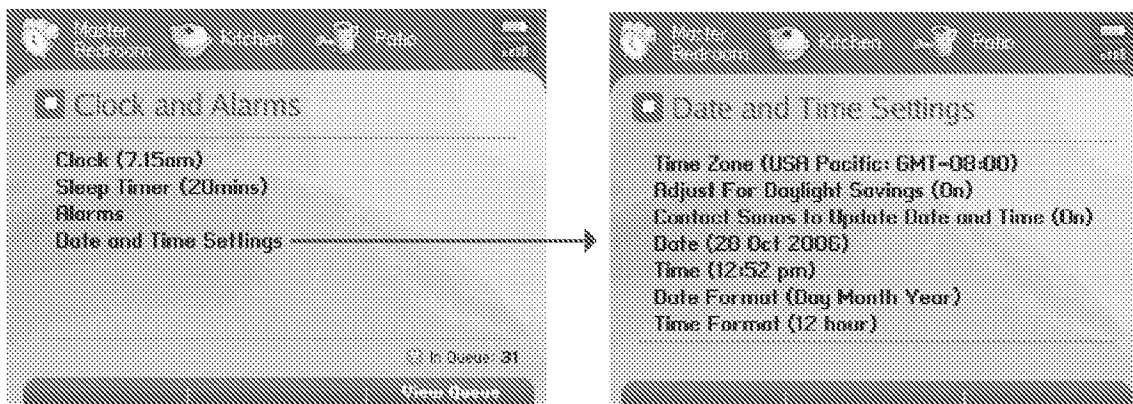
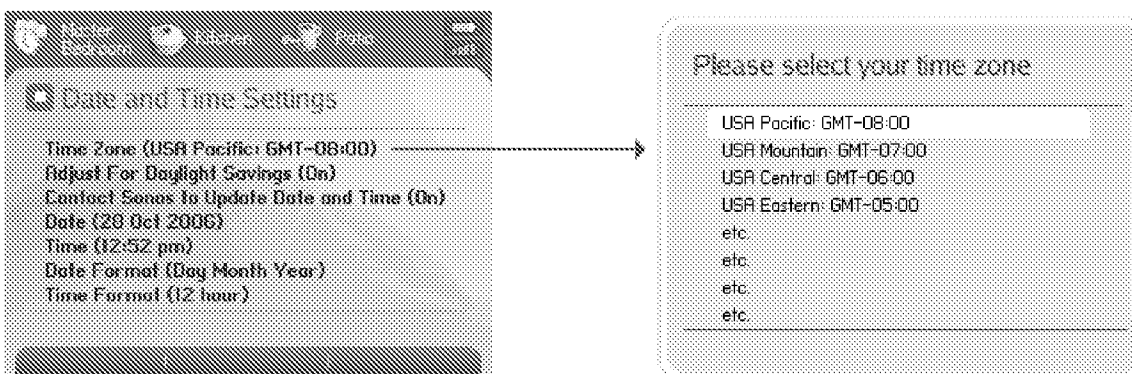
Sonos UI Specification: Alarm Clock

Alarm length/Sleep timer icon on Now Playing Screen

See Section on Sleep Timer earlier in this document.

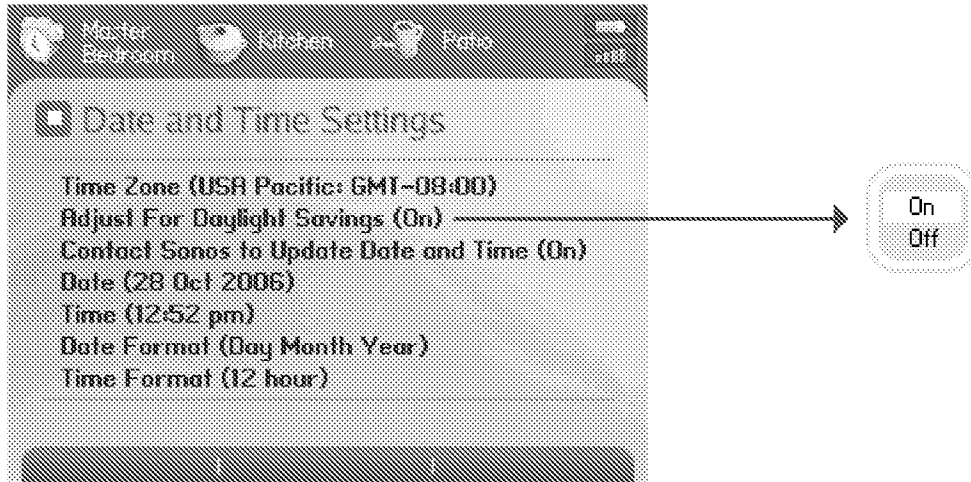
3.7.7 Play Alarm Now



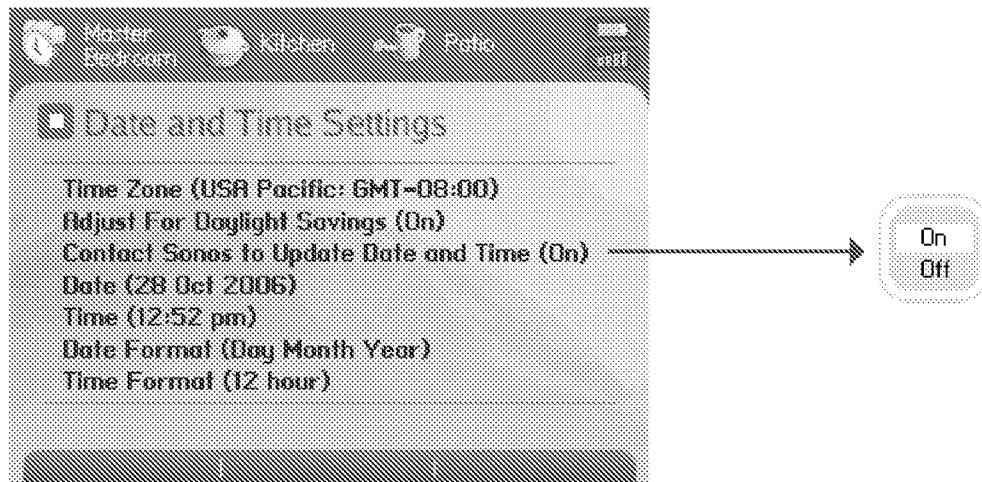
Sonos UI Specification: Alarm Clock**3.8 Setting the current date and time****3.8.1 Time Zone**

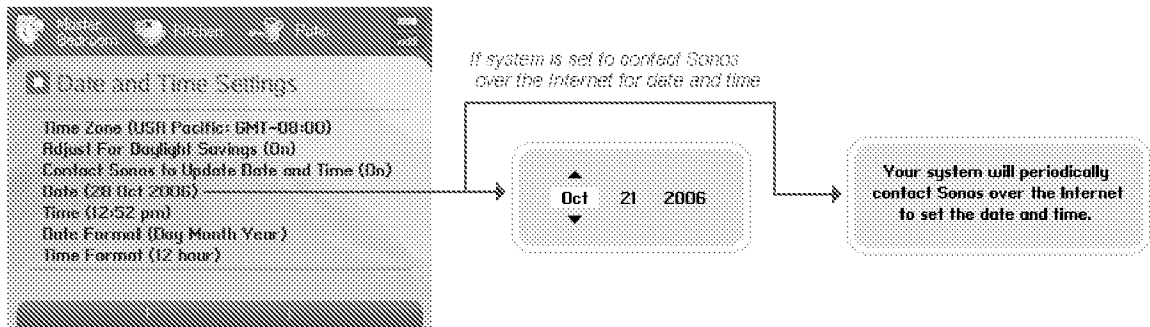
Sonos UI Specification: Alarm Clock

3.8.2 Adjust for Daylight Savings

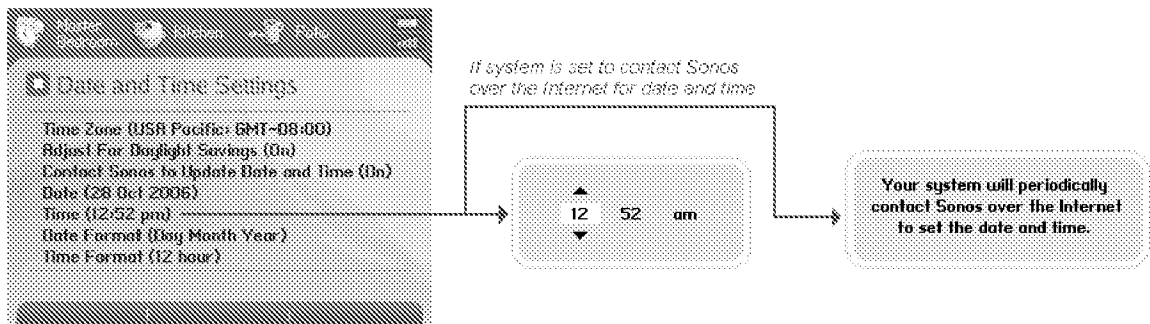


3.8.3 Contact Sonos for Updates



Sonos UI Specification: Alarm Clock**3.8.4 Date**

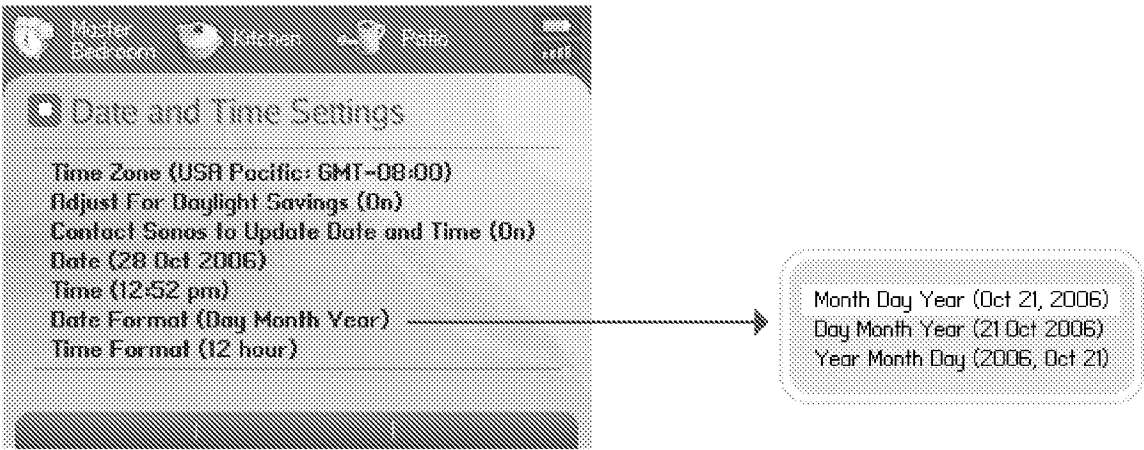
- If the system is set to get the date and time from the Internet, the user should not be able to manually adjust the date and time.
- In this case, a simple message is shown instead of the date or time editor.

3.8.5 Time

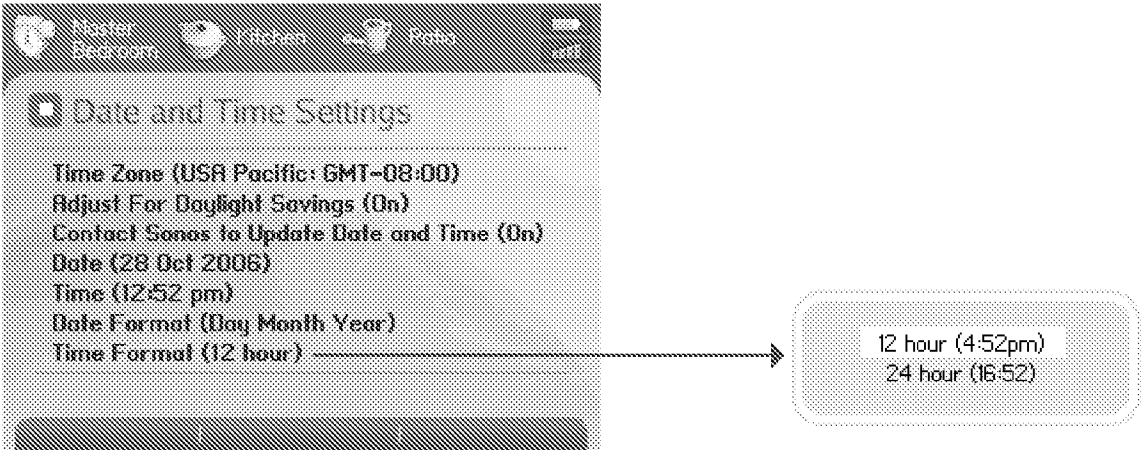
- If the system is set to get the date and time from the Internet, the user should not be able to manually adjust the date and time.
- In this case, a simple message is shown instead of the date or time editor.

Sonos UI Specification: Alarm Clock

3.8.6 Date Format

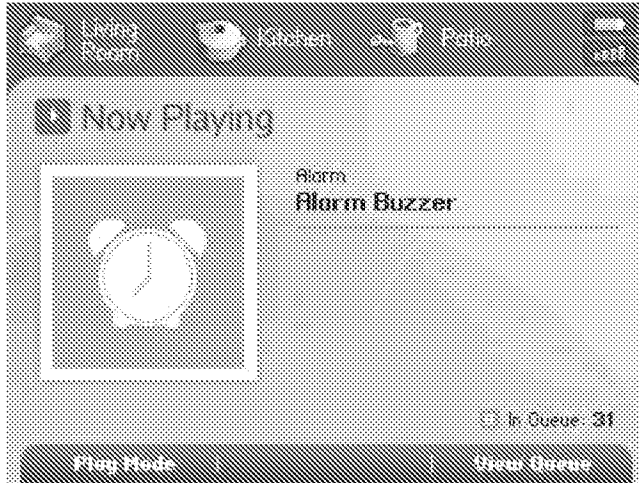


3.8.7 Time Format



Sonos UI Specification: Alarm Clock

3.9 Buzzer



- Buzzer has it's own Now Playing screen
- Play/Pause will work the same as regular music
- The template for the Now Playing screen if the Line-In Source Now Playing.

Sonos UI Specification: Alarm Clock

4 UI Spec for DCRs

4.1 PC Menu



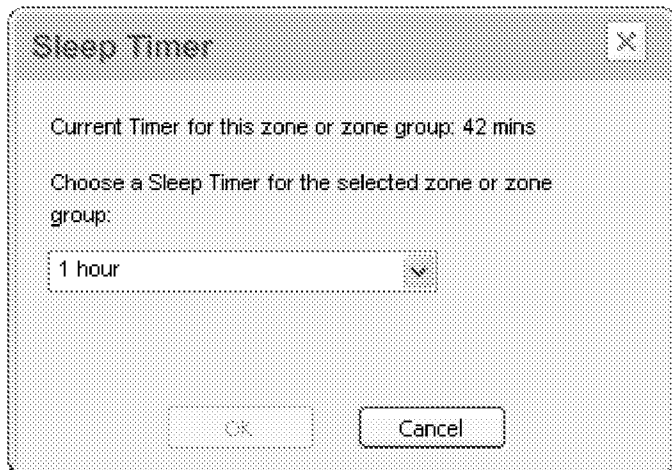
Letter Underscore shortcuts

Current underscore short cuts on this menu: N, P, L, D, Z

Click and Alarms (C)

Sleep Timer (S)

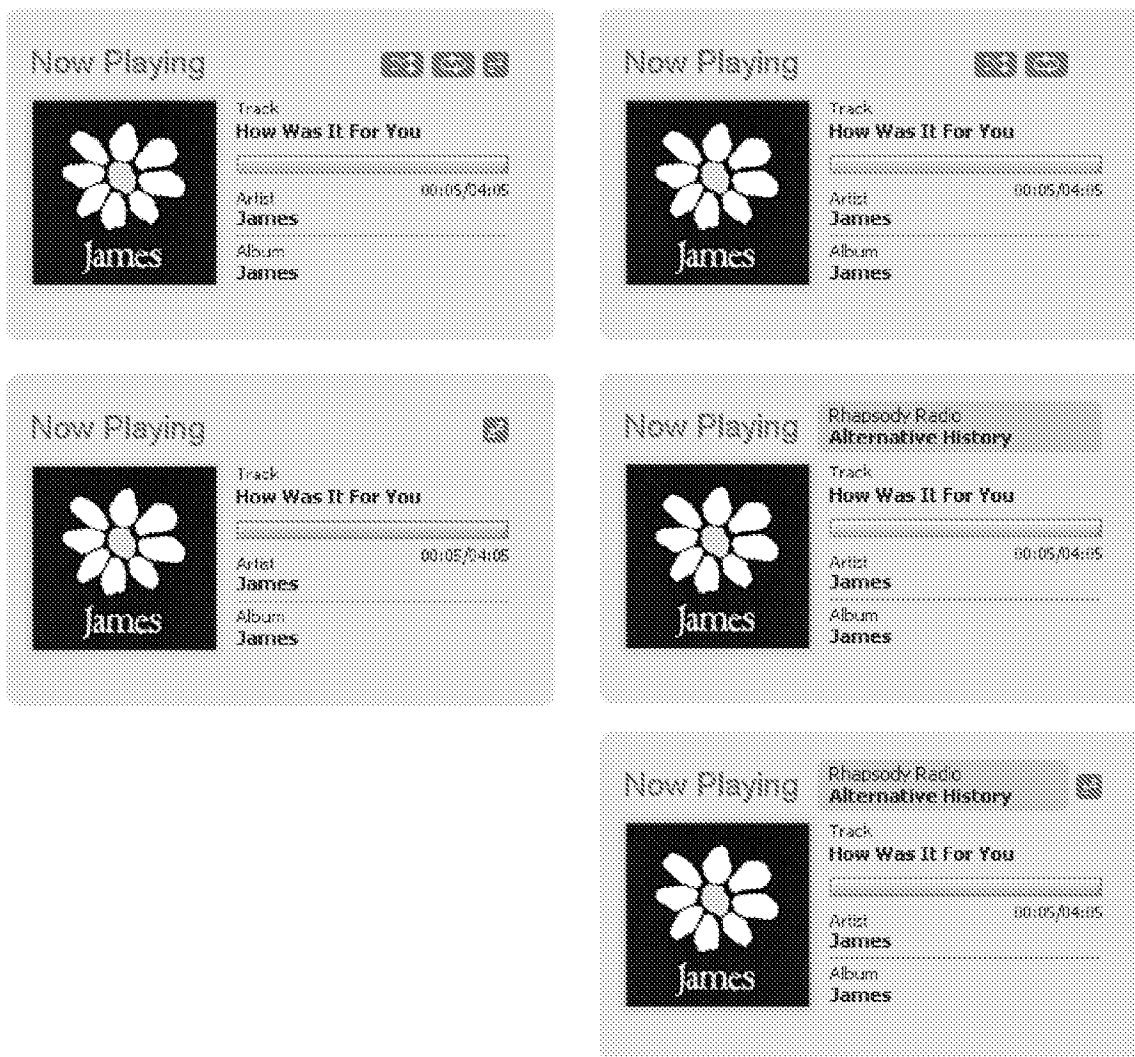
Sonos UI Specification: Alarm Clock

4.2 Sleep Timer

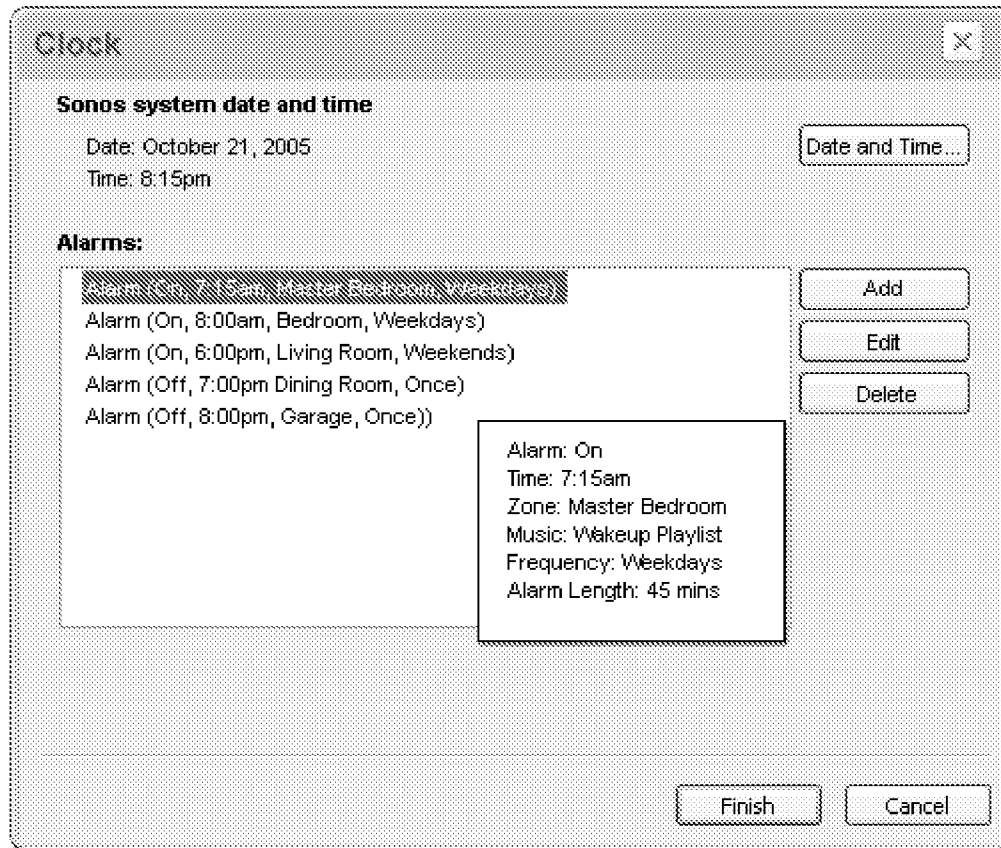
- Sleep timer will have the following variables: Off, 15min, 30mins, 45mins, 1hours, 2 hours.
- A sleep timer applies to all the current zones in the current group
- When the sleep timer stops (i.e. the time reaches 0 seconds), it should revert to 'Off'.
- At the end of the sleep time (0 seconds), the current Zone Group should be Paused.
- The time in parenthesis should show the count down.
- If the current zone group is already paused, no changes to the play head will be made.
- (the alarm timer is the same as the sleep time, described later in this document)

Rules for Zone Group changes while the Sleep timer is active

- A Sleep timer is set for the current zone (or zone group) that the user is viewing on the CR. The timer is applied to all the zones in that particular group.
- Any zone added to the zone group takes on the same timer.
- Any zone dropped from the group will have it's timer reset to Off.
- Any zone taken by another group will take the timer of the group it is joining (i.e. it will lose it's original timer).
- Pausing the music has no effect on a sleep timer .
- Clearing the Queue has no effect on a sleep time .
- Altering the Queue (adding, moving, deleting tracks) has no effect on the sleep timer
- The user can change the timer settings while it is running (i.e. turn it off, or change the sleep time).

Sonos UI Specification: Alarm Clock**The Now Playing screen showing the Sleep Timer/ Alarm Timer**

- The sleep timer icon is shown next to the Shuffle and Repeat icons
- The right edge of the snooze icon aligns with the right edge of the track progress bar
- The separation between the icons is 6 clear pixels
- The blue Rhapsody Radio 'bubble' should be horizontally resized when the snooze icon is present.
- The gap between the right edge of the blue bubble and the left edge of the snooze icon should be 6 clear pixels.
- The snooze icon should sit vertically in the middle of the blue bubble (in actual fact it will be off-centre (lower) by one pixel).
- The Shuffle and Repeat icons will need to be lowered to align horizontally with the snooze icon.
- TBD – can a tooltip rollover show the remaining time.

Sonos UI Specification: Alarm Clock**4.3 Clock and Alarms**

TBD –state when the time has been lost (due to power failure for instance)

Alarm List

- Shows each alarm with a list of major attributes (but not all attributes)

Tool Tips

Tip box shows an overview of all the Alarm's attributes

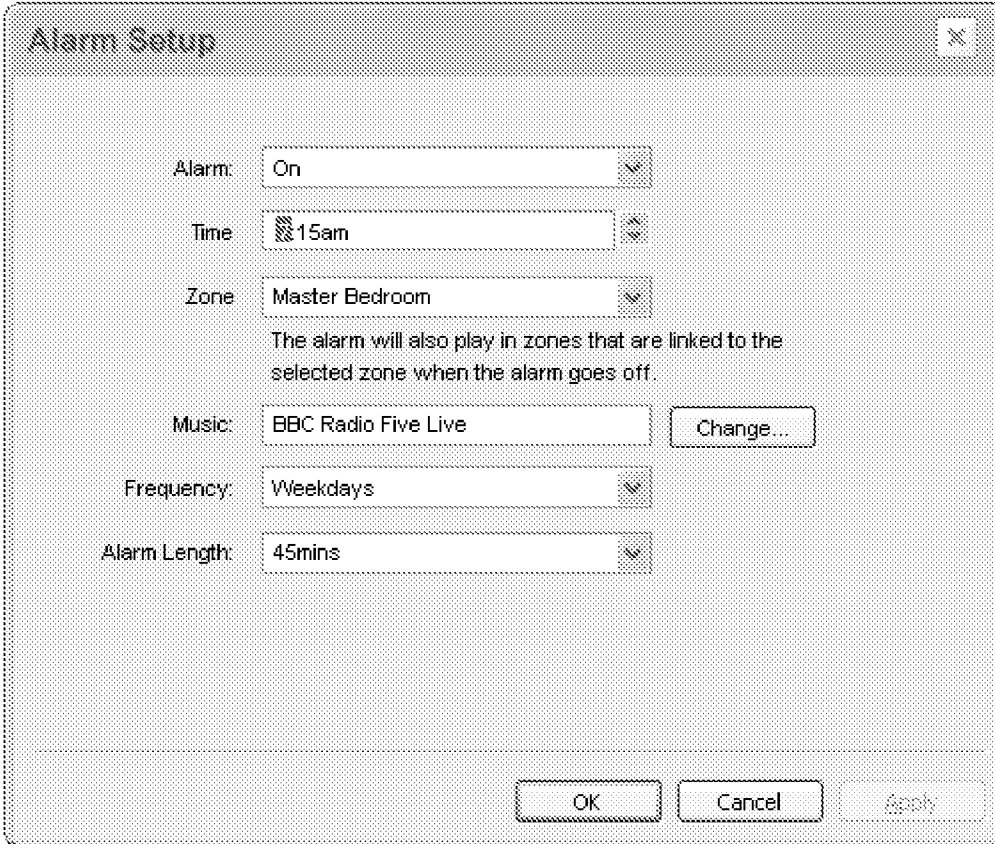
Add Alarms

- Alarms are named with standard names – no custom names for alarms.
- The system limits the number of alarms to 32 alarms
- If n alarms is exceeded, the following message will show:
 - You can't add any more alarms, please delete an alarm before you add a new one [OK]

Delete

- Following message:
 - Are you sure you want to delete the alarm? [Yes] [Cancel]

Sonos UI Specification: Alarm Clock

4.4 Edit an Alarm

The image shows a screenshot of the 'Alarm Setup' dialog box. The dialog has a title bar with the text 'Alarm Setup' and a close button (X). The main content area contains several settings:

- Alarm:** A dropdown menu with 'On' selected.
- Time:** A time selection field showing '15am' with a small icon of a clock face.
- Zone:** A dropdown menu with 'Master Bedroom' selected.
- Music:** A text field containing 'BBC Radio Five Live' and a 'Change...' button to its right.
- Frequency:** A dropdown menu with 'Weekdays' selected.
- Alarm Length:** A dropdown menu with '45mins' selected.

Below the 'Zone' dropdown, there is a note: 'The alarm will also play in zones that are linked to the selected zone when the alarm goes off.'

At the bottom of the dialog, there are three buttons: 'OK', 'Cancel', and 'Apply'.

Sonos UI Specification: Alarm Clock

4.4.1 Details of Settings**Alarm**

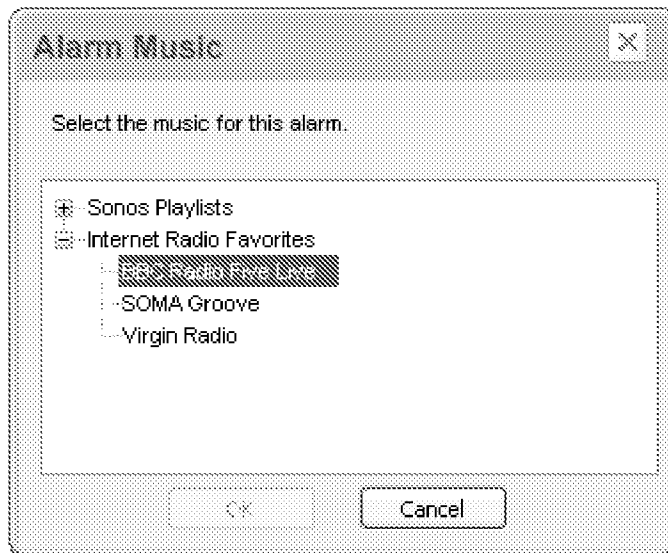
- On
- Off
-

Time

- Same as default Windows/Mac time setting field

Zone

- A single list of the zones in the system is presented.
- The alarm will also sound in any rooms that are linked to the selected zone at the time of the alarm.

Music

- TBD – this could also be a combo-box with sub menus.
- TBD – we may add “Rhapsody Stations” and “Current Queue” to this list.

Frequency

- Once
- Weekdays
- Weekends
- Everyday

Alarm Length

- No Limits
- 15 mins
- 30 mins
- 45 mins
- 1 hour

Sonos UI Specification: Alarm Clock

- 2 hours

- The ‘No Limit’ option means that no alarm timer will be set
- The alarm timer is the same as the sleep timer.
- When an alarm with a timer (anything other than ‘no limit’) starts, the sleep timer for the zone (or zone group) is triggered.
- Users can override the alarm timer by setting the sleep timer.

Zone linking/unlinking activities

- The alarm length applies to the zone group at the time the alarm is triggered (zone + any linked zones)
- Any zone later added to the group will take on the timer from this alarm.
- Any zone dropped from the group will no longer take part in the alarm length timer.
- Any zone from this group taken by another group will take the timer of the group it is joining (i.e. it will lose it's original timer).
- Pausing the music has no effect on the alarm length timer .
- Clearing the Queue has no effect on a sleep timer .
- Altering the Queue (adding, moving, deleting tracks) has no effect on the sleep timer

The Now Playing screen showing the Sleep Timer/ Alarm Timer

See Section for Sleep Timer earlier in this document.

Sonos UI Specification: Alarm Clock

4.5 Setting the current date and time on the Desktop Controllers

During the initial setup Wizard, if the DCR is creating a new system (i.e. not just joining an existing system) – the date and time from the PC will be captured and used for the Sonos clock..

Set Up Date and Time

Time zone: Central Standard Time (US and Canada)

☒ Automatically adjust the clock for daylight savings changes

Date format: Day Month Year

Time format: 12 hour

☐ Set the date and time from the Internet

☒ Set the date and time manually

14 April 2006

12:39 PM

Ok Cancel

Sonos UI Specification: Alarm Clock**4.6 Setting alarm music directly from the Music Library**

This feature is TBD pending feedback from John B.



Should the user be able to add to a New alarm – in which case the edit alarm panel should then open.

4.7 Buzzer

- Buzzer has it's own Now Playing screen
- Play/Pause will work the same as regular music
- The template for the Now Playing screen if the Line-In Source Now Playing.

Sonos UI Specification: Alarm Clock

5 Date and Time formats

5.1 Date Formats

Three date formats will be provided

Date Month Year (DMY)

Month Date Year (MDY)

Year Month Date (YMD)

Desktop Controllers

Months are written in full

(MDY) October 21, 2006 (date should be followed by comma)

(DMY) 21 October 2006 (no commas)

(YMD) 2006 October 21 (no commas)

Handheld Controllers

Months will be abbreviated to 3 or 4 letters.

Days of the week (clock face only) will be abbreviated to 2 or 3 letters

Setup screens and menus will show:

(MDY) Oct 21, 2006

(DMY) 21 Oct 2006

(YMD) 2006 Oct 21

For the clock screen, use shortened versions of the day of the week.

(MDY) Mon, Oct 21, 2006

(DMY) Mon, 21 Oct 2006

(YMD) 2006 Oct 21, Mon

Abbreviations for English are as follows:

Mon, Tue, Wed, Thu, Fri, Sat, Sun

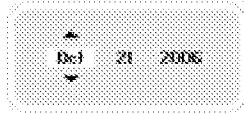
Jan, Feb, Mar Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec

Setup dialogs

Setup dialogs that show separate fields for fields will not contain commas or colons

For example, the following setup dialog does not contain a comma, even though the date is written-out with a comma (**Oct 21, 2006**)

Sonos UI Specification: Alarm Clock

**5.2 Time Formats**

Two time formats will be provided

12 hour clock (am/pm)

24 hour clock

A colon (:) should be used to separate hours and minutes. Seconds are not used anywhere in the UI.

12 hour

HH:MM_am (where am, pm are localized)

24 hour

HH:MM

Single digit times should not be expressed with a leading zero

12 hour clock

Use 6:17 am

Don't use 06:17 am

24 hour clock

Use 6:17 and 0:12

Don't Use 06:17 and 00:12

5.2.1 Date Range limits

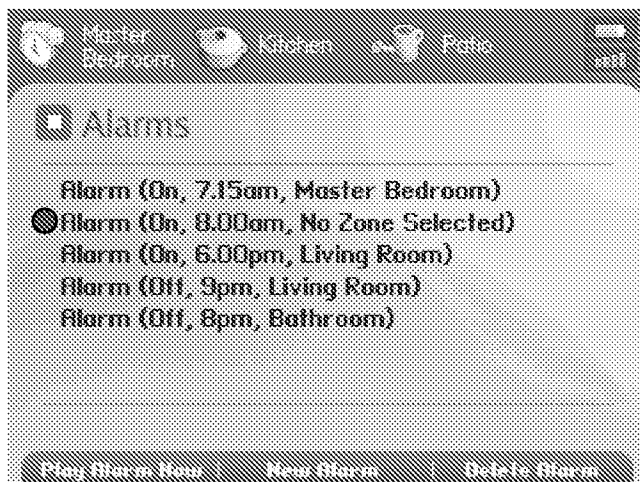
It will be possible to set the clock and alarms from 12.00am year 2000 to 11.59 2099.

Sonos UI Specification: Alarm Clock**6 Special Cases****6.1 Lost ZonePlayers and Hidden ZonePlayers - HHCR**

No ZonePlayers in the system - UI reverts to the Zone menu with limited settings. Access to Clock and Alarms is not possible.

Only Hidden ZonePlayers in the system - reverts to the Zone menu with limited settings. Access to the Clock and Alarms is not possible.

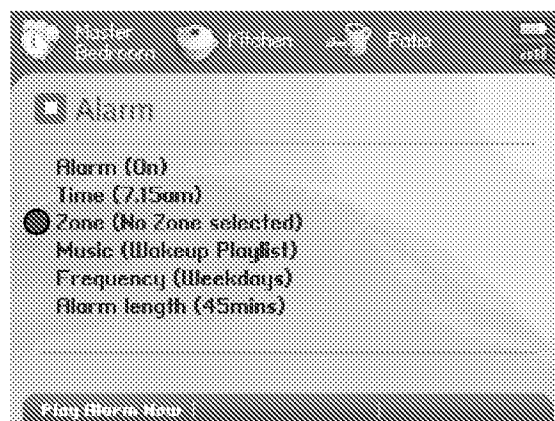
If a zone assigned to an alarm becomes lost, or hidden



Alarm Overview shows a hidden, or non-available zone



Zone available (normal state)



No Zone Available, or Zone is hidden.

Sonos UI Specification: Alarm Clock

- If a zone becomes unavailable, or it becomes a hidden Extender, the Alarm zone menu item will show “No Zone Selected”. The alarm will not sound. The Alarm should however remain in the ‘On’ state (in the case of a ZP that is temporarily unplugged).
- If the ZP becomes available again (Plugged back in, or brought out of extender mode), the Alarm zone will show the ZonePlayer name.
- If an alarm is renamed, the Alarm zone menu item will show the new name.

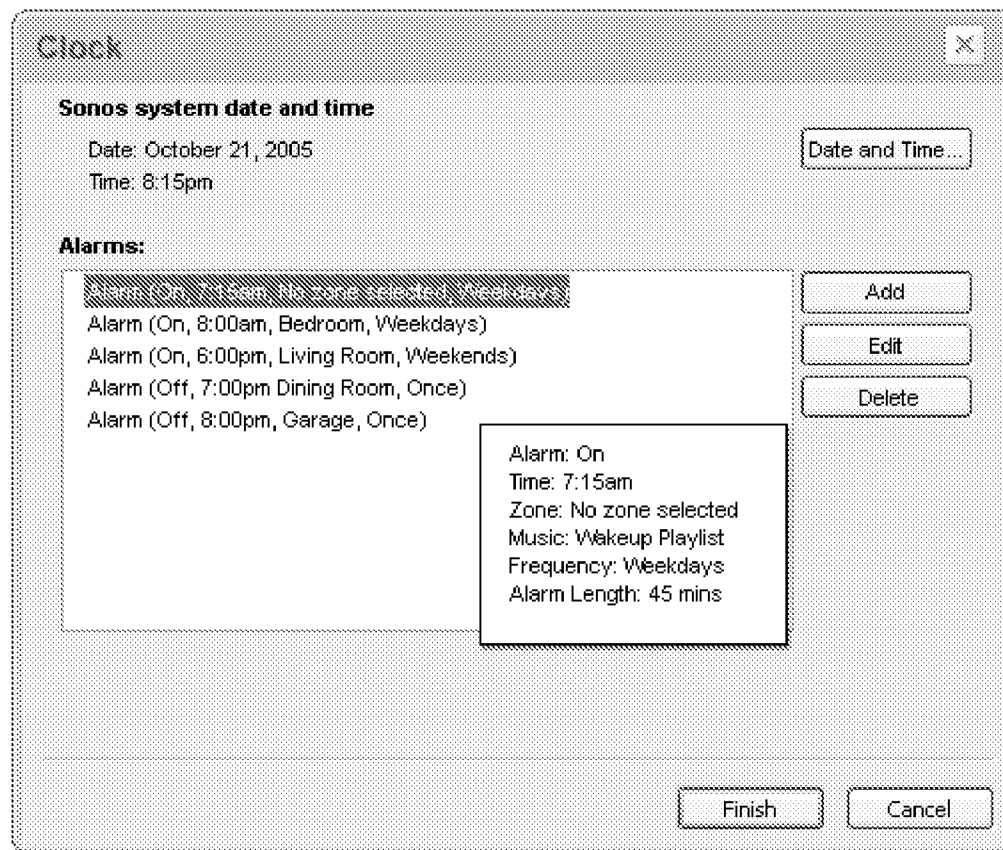
Sonos UI Specification: Alarm Clock**6.2 Lost ZonePlayers and Hidden ZonePlayers - DCRs**

No ZonePlayers in the system or if all ZonePlayers become hidden

Clocks and Alarms menu item will be grayed-out.

However, if the Clocks and Alarms dialogs are already open:

- The Alarms overview panel will remain open if no Zones are present, but all the alarms in the table should be cleared.
- Likewise the Add, Edit and Delete buttons will be grayed-out.
- The date and time should also be cleared, and the "Date and Time" Settings button should be grayed-out.
- If the "Edit" alarms modal dialog/sheet is open, All selections should be grayed-out, except 'cancel'.

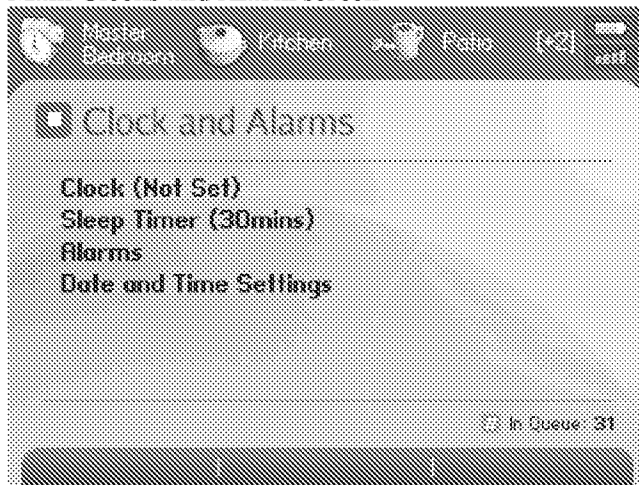


Sonos UI Specification: Alarm Clock

6.3 No Date or Time - HHCR

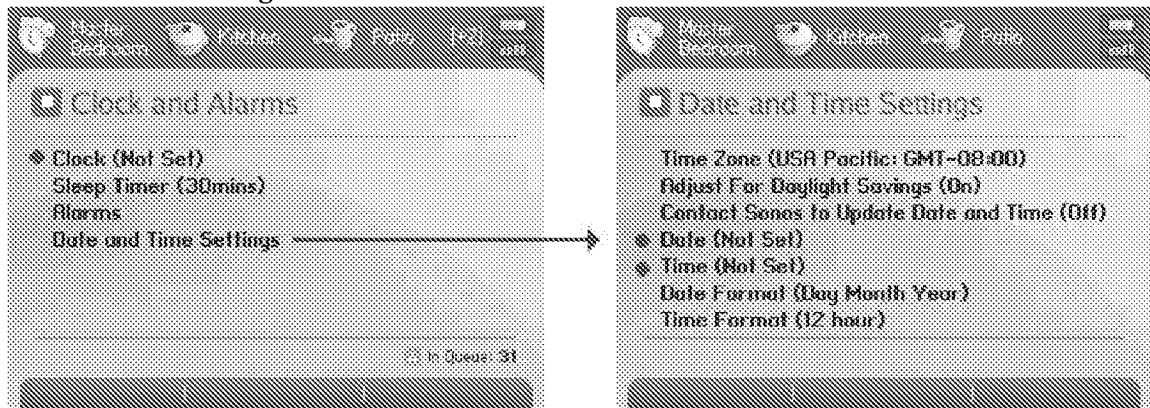
Date and Time can be lost if:

- The date and time are set manually and all the ZPs in a system lose power
- Date and Time are set to Internet time, the Internet connection is broken and all the ZonePlayers lost power.

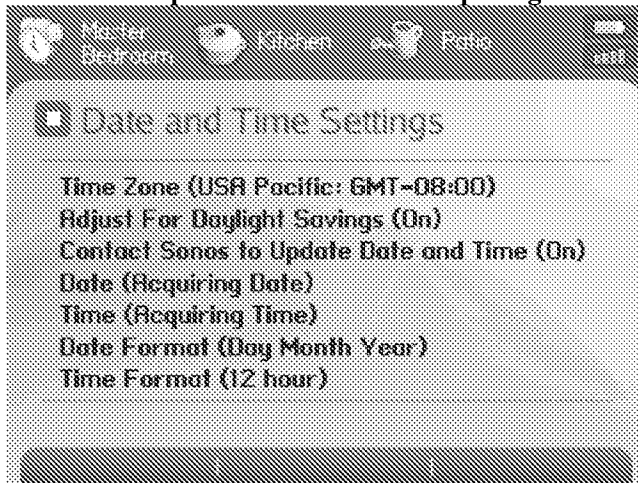
Main Clocks and Alarm screen**Clock Screen**

Sonos UI Specification: Alarm Clock**Alarms Overview Screen**

Nice to have, if user tries to view/set alarms while there is no time, we show a dialog box that informs the user (but doesn't prevent them from viewing and editing the alarms).

Sonos UI Specification: Alarm Clock**Date and Time Settings**

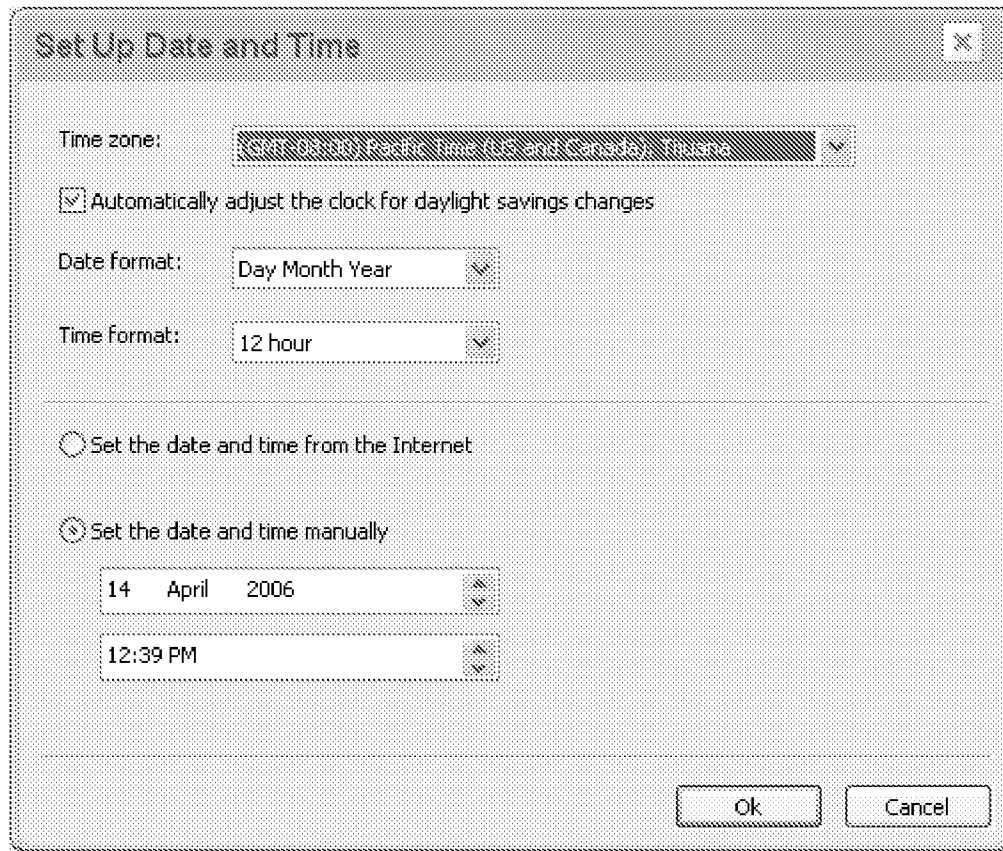
For the short period while Sonos is acquiring the time, but it is not yet set



It is proposed that we only show 'acquiring' on the Date and Time settings page.

The 'acquiring' message does not need to propagate to other screens of the UI.

Sonos UI Specification: Alarm Clock

6.4 No Date or Time - DCRs

- The red text under the Internet date and time communicates that the Internet connection to SonosTime is not available. At this stage the system will be either counting time using its internal clock, or the time will be not set.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	Controlling and manipulating groupings in a multi-zone music or media system			
First Named Inventor:	Robert A. Lambourne			
Filer:	Joe Zheng			
Attorney Docket Number:	RIN-022P			
Filed as Small Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional Application filing fee	2005	1	100	100
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				100

Electronic Acknowledgement Receipt

EFS ID:	1198006
Application Number:	60825407
Confirmation Number:	1970
Title of Invention:	Controlling and manipulating groupings in a multi-zone music or media system
First Named Inventor:	Robert A. Lambourne
Customer Number:	26797
Filer:	Joe Zheng
Filer Authorized By:	
Attorney Docket Number:	RIN-022P
Receipt Date:	12-SEP-2006
Filing Date:	
Time Stamp:	23:58:04
Application Type:	Provisional
International Application Number:	

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 100
RAM confirmation Number	722
Deposit Account	502436
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

File Listing:

Case 3:21-cv-07559-WHA Document 66-1 Filed 06/15/21 Page 258 of 258

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Specification	ProvisionalAsfiled.pdf	117135	no	14
Warnings:					
Information:					
2	Drawings	Drawings.pdf	94791	no	5
Warnings:					
Information:					
3	Specification	AppendixA.pdf	450053	no	20
Warnings:					
Information:					
4	Specification	AppendixB.pdf	979042	no	43
Warnings:					
Information:					
5	Fee Worksheet (PTO-875)	fee-info.pdf	8123	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1649144		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p>					